DOCUMENT RESUME

ED 029 615 24 HE 000 956

By-Sizemore, Oral Glen
A Study of the Semantic Differential Based on Motivational Concepts as a Technique for Predicting Student Achievement.
Northeastern State Coll., Tahlequah, Okla.
Spons Agency-Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No-BR-7-G-060
Pub Date Jan 69
Grant-OEG-7-8-000060-0021-010
Note-118p.
EDRS Price MF-$0.50 HC-$6.00
Descriptors-*Academic Achievement, *Academic Aptitude, Achievement, *Grade Prediction, Higher Education, *Learning Motivation, *Predictive Measurement, Student Motivation
Identifiers-*Semantic Differential Scale

The purpose of this study was to develop a semantic differential scale based on achievement motivation concepts by which grade point averages could be predicted. A scale was constructed and administered to 944 freshmen at Northeastern State College in Fall 1967. Two approaches were used. One was to combine semantic differential scale scores derived from motivation concepts with aptitude scores into a general multiple regression equation. The other was to hold the academic aptitude constant and apply the semantic differential scale scores to students of equal ability. In this approach, a separate multiple regression equation is necessary for each academic aptitude level. Students were grouped according to their academic aptitude and sex. Multiple correlations between grades and semantic differential scale scores which were significant at or above the .05 level of confidence were found for each group of subjects. The conclusions were that the semantic differential technique constructed from achievement motivation concepts can predict grades but the scale devised here is unsatisfactory for predictive purposes. Through further study and improvement, it could possibly become useful for screening, counseling and admission activities. (Author/JS)

BR-7-G-060

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ED029615

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January 1969

U.S. DEPARTMENT OF HEALTH
EDUCATION, AND WELFARE

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Tahlequah, Oklahoma

January 15, 1969

The research reported herein was performed pursuant to a grant with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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SUMMARY

A STUDY OF THE SEMANTIC DIFFERENTIAL BASED ON MOTIVATIONAL CONCEPTS AS A TECHNIQUE FOR PREDICTING STUDENT ACHIEVEMENT

Problem: Development of a semantic differential scale based on achievement motivation concepts by which grade point averages can be predicted.

Methods and Procedures: A scale was constructed which was administered to 944 freshman students. Two approaches were used (1) a check of the extent to which the scale would predict for students having the same level of academic aptitude, and (2) by including academic aptitude as a variable with semantic differential scales into a multiple regression equation.

Results: In each group of subjects for several stratifications (sex and intelligence) multiple R's were found which were significant above the .05 level of confidence.

Conclusions: The semantic differential technique constructed from achievement motivation concepts can predict grades. The scale used here is not satisfactory for predictive purposes but through further study and improvement it possibly could become extremely useful for screening, counseling, and/or admittance purposes.

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CHAPTER 1

INTRODUCTION

This study was concerned with the development of a semantic differential scale related to motivational concepts. More specifically, the study investigated the extent to which the semantic differential scale predicted students' college achievement as determined by their grade point average.

Need for the Study

In 1950 there were 2,214,000 students enrolled in institutions of higher learning; by 1960 there were 3,570,000; and by 1966 there were 6,085,000. Projections have indicated that there will be 7,296,000 students by 1970 and 9,088,000 by 1975. Between 1950 and 1960 the total college population increased 61.7 per cent, and between 1960 and 1966 it increased 70.4 per cent. Projections based on known population increase and probable human fertility rates have indicated an even greater per cent of increase in the number of college students in the more distant future (U. S. Bureau of Census, 1964, 1968).

In the growing complexity of our society, the demand is ever increasing for college trained personnel to fill professional positions. This demand, with the mushrooming number of college-age young people, is taxing the various institutions of higher learning beyond their capacity to adequately provide either facilities or instruction. To relieve over-enrollment, most institutions have devised selective admission practices. Even with selective admission based on past achievement and scholastic aptitude scores, nearly half of the students who start to college do not finish. Research indicates that lack of scholastic aptitude can account for only a part of this failure. Likewise, there is relatively little understanding of the inner dynamics which direct the behavior of these individuals who possess the academic ability necessary to succeed but who fail to meet the established standards of the institution which they attend.

Since World War II there has been a vast increase in research into personality factors which may affect academic success. Many of the studies have attempted to use existing personality instruments or techniques randomly to determine relationships between whatever the instrument measures and academic success. This procedure has not proved successful. Other efforts have been directed toward motivational factors which seemingly affect achievement. Specific scales which purport to measure achievement motivation have been designed and show promise, but currently they are unable to predict at a level higher than instruments measuring intellective factors. Combinations of intellective factors and non-intellective factors have not proved to be sufficiently valuable to be used for other than continued research.

The problems inherent in selection of college students continue. Although the existing predictive devices may eventually be revised and refined to the degree that they adequately serve their intended purpose satisfactorily, the history of their development indicates that their refinement is a slow process. Likewise, there is some indication that predictors using cognitive functions have reached an impasse in their ability to predict.

A technique which has not been sufficiently investigated but which shows logical promise as an academic predictor is Osgood's (1957) semantic differential. The present study was designed to investigate the semantic differential technique applied to motivation concepts as a means of predicting academic success. More specifically this study will investigate the ability of a semantic differential scale using motivational concepts to:

1. predict the extent to which students of equal ability will differ in achievement.
2. combine with existing academic aptitude scores to provide a better predictive device than either measure can provide alone.

Definitions of Terms Used

In this study the following definitions were used:

Academic aptitude is the composite score achieved by the student on the American College Test.

Criterion of achievement is the student's grade point average for the semester in which the index of motivation was assessed.

Limitation of the Study

The study was limited to the investigation of motivational concepts as assessed by semantic differential scales as a factor in scholastic achievement of freshman students at Northeastern State College.

Review of Literature

In this section is presented research concerning college dropouts, admission practices, and prediction of academic achievement. Prediction is examined on the basis of both intellective and non-intellective factors. Particular attention is given to the various methods by which the personality factor--motivation has been assessed. Basic shortcoming discovered in the review of achievement prediction research are discussed.

Unfortunately being admitted to college provides no guarantee of completion of an academic program. Not every student who enters college will finish or even complete the first semester. Summerskill (1962) indicated that approximately half of those entering do not finish. Two studies by Iffert (1957, 1965) provided information concerning the national drop-out problem. In his 1957 study representing a sampling of 13,700 students enrolled in the fall of 1950, he found that only 40 per cent of the freshmen would remain for graduation four years later. Through transfer and re-entry about 60 per cent would eventually receive degrees. He stated, "The first year of college is the most critical dropout period...273 left school within the first year in comparison with 283 per 1,000 during the next 3 years." His 1965 study included 1,000 selected enrollees in twenty different institutions of higher learning during the academic year 1957-58. He found that 2,398 of those students dropped out or did not re-enroll the following semester. The major reasons for leaving college were academic (45.8 per cent), health and family problems (25.2 per cent), and financial (15.0 per cent).

A study by the Oklahoma State Regents for Higher Education (1964) of the students entering Oklahoma institutions of higher learning in the fall of 1962 discovered:

> ...some 836 out of every 1,000 freshmen...enrolled in the institutions of first registration at the beginning of the second semester. After two semesters had elapsed, however--by the beginning of the following fall--only 581 students per 1,000 were still enrolled in the institution of first registration

The total number of drop-outs or non-returnees for the academic year 1962-63 was 4,767 of 13,326. The median grade point average for those leaving at the end of the first semester was 1.5 (4.0 = A).

Above average students also have retention problems. Hill (1966) found that 37.5 per cent of 628 above average freshmen admitted to the University of Texas in the fall of 1959 had withdrawn prior to completion of a degree within five years. Twelve and seven-tenths per cent of those withdrawing were enforced academic withdrawals. Twelve per cent of the females and thirty-six per cent of the males withdrawing were on academic probation at the time of withdrawal.

It is painfully evident that not all students who enroll in college are academically qualified or if qualified are not sufficiently motivated to put forth enough effort to be academically successful.

Admission selection procedures have been in effect in many prestige institutions for years. These procedures have been extended to state universities and colleges in the past two decades. Iffert (1965) found that the twenty institutions he studied admitted only sixty-one per cent of their applicants as early as 1956. Oklahoma has recently instituted more stringent entry levels for certain institutions while allowing entrance to other institutions for all who choose to attend them or for students who do not qualify for the more selective institutions. Drop-out figures indicate that the present basis of selection does not function satisfactorily. A review of the bases on which students are selected for admission seems germane to this study.

Intellective factors are currently the most used bases for admission. They include high school achievement, intelligence, academic aptitude, and scores on general achievement tests. In a summarization of 580 admission studies by Fishman and Pasanella (1960), 263 studies used high school grades as predictors. High school grades correlated roughly .50 with the first year college grades. Garrett (1949) and Smith (1964) cite the high school academic record as the best single predictor of college grades. Fishman and Pasanella also found that "...because secondary schools vary widely in standards, students, and curriculums, most colleges found it important to include some standardized aptitude and/or achievement tests in their selection measures." In the studies cited, they found such commonly used scholastic aptitude tests as the *American Council on Education Psychological Examination*, the *Ohio State Psychological Examination*, and the *Scholastic Aptitude Test* had an average correlation of .47 with the freshman grade point averages. Intelligence tests such as the *Otis* were not found to be useful in prediction of grades as aptitude and/or achievement tests.

Fishman and Pasanella (1960) also found many multiple-correlation studies:

> In 216 which employed only intellective predictors, the multiple-correlations with freshmen average ranged from .37 to .83 with a median of .62.
>
> ...In 21 studies which used an aptitude test and the high school record, the multiple-correlation was increased anywhere from .00 to .23 beyond the zero-order correlation based on high school average alone, with a median rise of .07. In general, the use of any one intellective predictor,

> or more than one, with the high school record improved the forecast of freshman average in 181 studies by .00 to .38, with an average gain of .11. It seems useless, however, to employ more than two or three intellective predictors, from both the point of view of practicality and of efficiency.

Frederiksen and Schrader (1962) summarized the findings of several predictive studies of freshmen veteran and non-veteran students. The studies utilized the American Council on Education Psychological Examination (ACE), which is an academic aptitude test; the grade point average in college; and high school rank. A median correlation of first year grades and high school rank was .57. Median multiple-correlations for veterans and for non-veterans were .60 and .68 respectively when high school rank and ACE scores were used as predictors.

A correlation of .59 was found by Funches (1965) between the first-year grades of 369 freshmen and their American College Test composite scores. Another study utilizing the ACT was conducted by Foster (1962) at Kansas State University. Correlations between various subscores of the ACT and typical college courses were .60 or higher except for oral communications, which was .45; calculus I--.42; accounting I--.48. In a study just completed, Dobbins (1969) found a correlation of .47 between composite ACT scores and first semester grades of 1,125 Northeastern State College freshmen. Although little research has been published other than by the publisher of the American College Test, the ACT is currently in use in some 13,000 institutions in fifty states as a required procedural step in securing admission to the institution.

In summary of research concerning intellectual factors, high school grades or rank and academic aptitude or achievement tests have been in wide use as predictors of college grades. Many studies showed that high school achievement is the best indicator. Correlation coefficients for intellective factors and achievement range up to about .60. Even with continued refinement the correlation between intellective factors and achievement will probably not climb much higher.

Non-intellective factors

Fishman and Pasanella (1960) found thirty-three studies which used non-intellective factors as academic predictors prior to 1960. These studies utilized such personality factors as the *Rorschach*, *Minnesota Multiphasic Personality Inventory*, *Manifest Anxiety Scale*, and various biographical data. The correlations between these instruments and academic success ranged from .01 to .62 with a median correlation of .22. Interest inventories yielded lower correlations ranging from .05 to .26, although only seven interest studies were reported. Correlations of age and socio-economic status with achievement were not significant.

Garrett (1949) found practically no correlation between personality in general and scholastic achievement in studies conducted prior to 1949. Gough (1953, a) questioned the wisdom and efficiency of earlier studies.

> ...most of the personality tests used were based on inefficient, *a priori* methods of test construction, and could hardly be depended upon to yield a valid assessment of personality factors.
>
> Second, the typical approach was the rather aimless empirical one of merely correlating a series of test scores with grade averages to see what might be discovered...the personality scales themselves were not constructed with any regard for problems of academic achievement, and would, accordingly, only in the most fortunate cases contain relevant and properly weighted items for such a task.

In order to overcome the deficiencies noted, Gough (1953, a) constructed a thirty-eight item true-false scale (Ac_r) and administered it to 234 high school seniors. The scale correlated .47 with grades. A multiple-correlation of IQ and Ac_r with grade average was .62. The Ac_r was administered to 180 college students and correlated only .18 with their introductory psychology grades. Gough concluded that college and high school grades are determined by a somewhat different constellation of factors.

In order to further study prediction of college grades, Gough (1953, b) developed a second personality scale Hr (honor point ratio). The scale consists of 36 items which the student accepts or rejects. It was administered to 1,253 students. The scale correlated .38 with psychology course grades. Observers tended to rate those students scoring high on the Hr scale as capable, intelligent, and reliable in contrast to those scoring low who were described as dissatisfied, dull, rigid, and shy.

Barnette (1961) used Gough's Hr scale to predict grades. He combined the Hr scale with the Iowa Picture Interpretation Test (projective technique). Only the Hr was found to be a useful predictor; the correlation between Hr and two semesters of college grades was .38. These results are in keeping with the results of other attempts to add projective scores to other factors as noted by Fishman and Pasanella (1960). Barnette also combined the Hr and scores from the Cooperative English Test to predict first year college grades. The resulting multiple correlation was .45.

Another attempt to predict grade point averages using the Hr scale was made by Bendig and Klugh (1956). A correlation of .32 was found for grades and *Hr* scores of 422 introductory psychology students. When *Hr* scores and high school rank were compared to grade point averages for one year, the multiple correlation was .45.

Van Zandt (1961) developed the *Achievement-Affiliation Motive Scale* (*AAMS*) with which to assess motivation of teachers. The scale was designed to be scored objectively and to be administered by non-psychologically trained people. Smith (1964) used the *AAMS* in conjunction with various intellective predictors in an attempt to predict grades for college freshmen. Multiple regression analysis of his data indicated the high school achievement record to be the best predictor of college success. Scores of the *AAMS* did not add significantly to prediction of academic success.

Another such attempt was made by Garms (1967) in which various items gleaned from instruments designed to measure personality traits were related to academic achievement. Factor analytic techniques identified items contained in the *California Personality Inventory*, *The Minnesota Multiphasic Personality Inventory*, *The Edwards Personal Preference Scale*, and Adorno's scales relating to ethnocentrism and authoritarianism. This scale showed a significant relationship to scholastic achievement.

A multiple regression equation combining Garms' scale with *Scholastic Aptitude Test - Verbal* scores yielded a correlation between predicted and achieved grades of .59 (significant at the .01 level of confidence). Sizemore (1968) using an adaptation of Garms' scale for predicting introductory psychology grades, found a correlation between the scale grades and actual grades in psychology of .60 for 199 students (significant at the .001 level of confidence).

Another attempt to replicate the Farquhar findings but with college freshmen as subjects was made by Hayden (1962). She found a low-positive relationship between the M-Scales and academic achievement in males. There is no significant relationship between the M-Scales and academic achievement for females. Likewise, there was no significant relationship between either male or female M-Scales scores and academic aptitude. Multiple correlations between academic aptitude and academic achievement were not significantly increased by adding sub- or total M-Scales scores to the estimates.

Another approach which has promise of being developed into a capable predictive device is McClelland's (1953) need for achievement (n ach) technique-a projective technique which is an adaptation of the Thematic Apperception Test. McClelland's rationale for development of this technique was guided by three hypotheses: (1) The method of measurement for maximum theoretical usefulness should be at least partially independent of the methods of measurement used to define the other two main variables in contemporary psychological theory--perception and learning. (2) Motives might best be measured in phantasy which fulfills the first requirement, since it differs radically from other methods of measurement. (3) Motives could be experimentally aroused by manipulating external conditions prior to assessment of the motive in question. This method differs from global projective techniques, since it was structured specifically to assess achievement motivation and was scored according to the dimensions of (1) long term involvement, (2) unique accomplishment, and (3) competition with a standard of excellence, all of which McClelland hypothesized to constitute need for achievement.

McClelland, et. al. (1953) reported a study in which his version of the *TAT* (now called *McClelland Need Achievement Test*--*MNAT*) was used as the measuring device by which need for achievement (*n ach*) scores were derived. A correlation of .51 (significant at the .01 level of confidence) between *n ach* scores and the grade point average of the two previous semesters was found when the *n ach* scores were compared with *SAT* scores, the relationship was found to be .42; when the correlation was adjusted for the effect which the *SAT* scores presumably had on the correlation, the relationship between *n ach* and grades was still significant at .39.

Lowell (reported by McClelland, 1953) found little correlation between *n ach* scores and predicted grades. The *n ach* scores used by Lowell were not from the same scale used in the previous study, and Lowell had reason to doubt the cooperativeness of many of his subjects. He also found that the arousal conditions preceding the administration of the scale affected greatly the degree of relationship which could be expected.

Morgan (reported by McClelland, 1953) held academic aptitude constant (his subjects had all scored above the 96th percentile on the *ACE*--*Total*) and compared grades of "achievers" and "non-achievers" with *n ach* scores. Forty "achieving" students had a grade point average of 2.1 or better, and thirty "non-achievers" had less than 2.1. He found that those students with high academic grades obtained reliably ($p > .02$) higher *n ach* scores than did those students with low academic grades.

To an investigation of the effect of social class upon *achievement motivation* which provides an internal impetus to excell and *value* orientations which define and implement achievement motivated behavior, Rosen (1958) used the MNAT to determine the extent to which need for achievement existed in his male, high school sophomore subjects. Among his findings was the indication that n ach is an important determiner of academic success: 69 per cent of those students rating high on n ach made a "B" grade point average or better, while only 35 per cent of those having a low n ach had a "B" or better average. The probability of this occurrence by chance was less than .001.

LaVerd (1960) utilized McClelland's (1953) technique in assessing through phantasy, the motivation level of 105 eighth grade students. He used four pictures which he chose for the TAT. Achievement was determined through the administration of the California Achievement Test, and intelligence was assessed through administration of the California Test of Mental Maturity. His motivation index correlated .52 with the achievement for the total group. Boys' motivation scores correlated .45 with achievement, while girls' scores correlated .64. All correlations were significant above the .01 level of confidence. With this group a multiple-correlation of motivation and intelligence scores with achievement scores was .88. However, the correlation between intelligence and achievement was .89. In a pilot study using somewhat different scoring methods for the motivation scale, the multiple correlation for boys was .93 and for girls was .98. However, in the pilot study the correlation between achievement and intelligence was only .43. The statistics cited are indicative of the ability of the method to predict achievement, but many questions would need solutions before the method could be utilized for purposes other than research.

In 1964 Dove used the MNAT and the Iowa Tests of Educational

Development to assess the relations between n ach and achievement. The resulting rank-order correlation for sixty-one students was .234, which is low but approaches significance at the .05 level of confidence. Her n ach scores were also correlated with grade point averages for the same students. The resulting rank-order correlation was .38, which is significant at the .01 level of confidence.

The studies by McClelland and his associates (1953) indicated that the conditions under which the n ach test is given, play a large part in the score which a subject would obtain. If achievement arousal conditions were instigated prior to the administration of the test, the subject would achieve a higher score. It was this score which was used in the majority of the studies in which significance was found. If the test must be given under achievement arousal conditions in order for significance to occur, further problems concerning the methods by which large groups are aroused must be determined if the test is to be used extensively as a predictive instrument. Studies by Wendt (1955) and Herron (1962) focus in part on this problem.

Wendt (1955) using the MNAT and a group of fifty-two high school and college students, found that those subjects who obtained a higher n ach score expended greater effort and obtained better quality on an arithmetic task. Tasks were administered under both scheduled and unscheduled (free-time) conditions. Subjects who had a higher n ach score worked proportionately harder than subjects with low n ach scores during unscheduled conditions. During scheduled conditions the work output of subjects with low n ach was sharply increased although significance reached only the .15 level of confidence. The n ach tests were given under what would be considered scheduled conditions.

Two findings from a study conducted by Herron (1962) seem to be pertinent to the question of differences in scores on projective techniques obtained under different arousal conditions. Herron used the Holtzman Inkblot Test (HIT) and the Test of Insight (TOI) with 180 subjects assigned randomly to an achievement arousal condition and to a neutral condition. The HIT is similar in nature to the Rorschach; the TOI is a ten statement test in which a respondent is asked to write a story about the statement. The TOI was designed to be used in lieu of the TAT or MNAT with college students in studies of motivation. It is scored in the same manner as the MNAT. Neither the HIT or the TOI yielded significant correlations with grade point average. The scores achieved under the two conditions, neutral and achievement arousal, were significantly different.

McClelland's Need Achievement Test has not been used extensively in attempts to predict academic achievement. Correlations from the various studies have been predominantly low; and if significant, they just meet the minimal standards for significance. Other problems also seemingly limit the practical utilization of the MNAT. The pictures which comprise the test can be shown to a group via opaque projection, the stories can be written in mass, but scoring remains an individualized process. Scoring scales, which aid in achieving objectivity, have been developed and by their use reliability has been greatly increased. However, the sheer weight of time required to score the stories seems to prohibit the utilization of the instrument, even if greater refinement and thus greater prediction can be attained. Another problem which is far more serious is that this device with the exception of one study has shown little ability to predict any type of motivation for females.

Intellective devices, although far from perfect, are in wide use in an attempt to identify students who can and hopefully will succeed in their academic endeavors. The loss of many students who are identified as capable is indicative of other factors which also must affect academic success. The use of various global personality tests and scales which have been designed to identify the extent to which an individual possesses some personality characteristic considered necessary for academic success has not proved to be of sufficient value in predicting academic success to be used widely as an admissions screening device. Combining intellective scales with non-intellective scales has likewise proved unprofitable.

Semantic differential

An approach which is receiving wide utilization in other areas but which has not been sufficiently studied as a possible technique by which academic prediction can be made is Osgood's (1957) semantic differential. The technique has obvious advantages: it is easy to construct, requires a minimum of administrative time, and is clearly amenable to machine scoring.

The literature revealed three studies in which the semantic differential technique had been used as a means of studying achievement. These studies have been presented in greater detail, since they have direct emphasis for the present study. Winter (1961) used a population of thirty-four male, freshmen students enrolled in introductory psychology. His purpose was to check the relationship between achievement and a student's ability to predict certain values which his instructor possessed. A semantic differential scale was composed of the following concepts: athletics, books, cheating, college, easy money, good time, grades, homework, play, professor, research, social activities, studying, tests, and work. Eight polar adjective pairs of evaluative nature were chosen from Osgood (1953). They were beautiful-ugly, clean-dirty, fair-unfair, good-bad, kind-cruel, nice-awful, sweet-sour, and valuable-worthless. Scoring was on a 1 to 7 scale per polar pair, and a student's score was obtained by correlating each of the concepts with grade achievement in elementary psychology. The following correlations were found: the semantic differential score correlated with the ACE-Total -- .36 (significant at the .05 level of confidence); with the ACE-Qualitive -- .13 (non-significant); with the ACE-Linguistic -- .40 (significant at the .01 level of confidence); with Father's education -- .04 (non-significant); with Mother's education -- .26 (non-significant); with the predicted orientation of the professor -- .38 (significant at the .05 level of confidence); and, discrepancy scores derived by subtracting the difference between a student's orientation from the orientation of his professor -- -.46 (significant at the .01 level of confidence). A correlation between the ACE-L and the student-professor scale was only -.10, which was not significant. One conclusion drawn was that the instrument could be refined and used as a predictor of academic success.

Meacham (1965) used the semantic differential technique in an attempt to develop a motivation scale which would correlate with grade point average, which was unrelated to academic aptitude, and which when added to known scores of academic aptitude would increase ability to predict achievement. The concepts used were self-appraisal (*SA*) and ideal-self (*SI*). Sixty polar pairs were used, although only thirty which applied to motivation concepts were scored. From a seven point scale per polar pair, three sets of scores were obtained: *SA*, *SI*, and a discrepancy score which was the difference between *SA* and *SI*. A total of 220 junior college students were used as subjects. Grade point averages were computed for past college grades and for the current semester. Academic aptitude was measured by the *American Council on Education-Linguistic* (*ACE-L*). A random sample of 100 students was chosen, and their scores were used for reliability and item analysis checks. A split-half reliability coefficient was obtained for the *SA* and *SI* scores. An extension by means of the Spearman-Brown prophecy formula yielded reliability scores of .886 for *SA* and .878 for *SI*. A reliability coefficient (not split-half) for the discrepancy scores was .761. The correlation between *SI* and *SA* was .523. An item index was computed by checking the scores of twenty-five students having the highest scores with twenty-five students having the lowest scores on the *SA* scale. With three exceptions the polar pairs discriminated between the high and low groups at above the .05 level of confidence. Although some items discriminated much more than did others, all seemed to have value; therefore, none was discarded. The *SA* scale was administered, and then the *SI* scale was administered a week later. The time seemed sufficient for students to forget specific responses.

The *SA* scores (raw) were correlated with accumulative and current grade point averages. The correlations were .290 with a standard error of .062 for the accumulative grades and .377 with a standard error of

.056 for the current grades. The correlation between academic aptitude (ACE-L) and SA scores was .036 with a standard error of .067, which does not differ significantly from zero. The ACE-L scores and grade point average correlated .450 with a standard error of .054. A multiple correlation combining ACE-L and SA scores and comparing them with grade point averages was found to be .567 with a standard error of .045. Meacham assumed that grade point average was indicative of adjustment to an academic world, the higher the discrepancy score the lower the grade point average. The correlation between the discrepancy score and achievement was -.363 with a standard error of .058, significant at the .01 level of confidence.

Meacham concluded:

1. An index of motivation was developed using a measure of the self-concept and the semantic differential technique.
2. The index of motivation was not correlated with academic aptitude but was predictive of the criterion, grade point.
3. When combined with a measure of academic aptitude the index of motivation added to the predictive power of this instrument.
4. The discrepancy score between the self-appraisal and self-ideal was negatively correlated with grade point.

Meacham recommended that further study be made to improve the predictive power of the self-estimate with regard to motivation. A wider population of students was recommended so that the research could be more generally applicable. He stated:

> Further research in this area is warranted in order to increase the predictive validity of those instruments designed to predict achievement in a school setting. There is some indication that the predictors using cognitive functions have reached an impasse in their predictive power. An approach through the affective domain shows promise.

Rosenthal (1965) did not attempt to predict achievement, but his study of achievers vs. under-achievers has direct bearing on the current study. He used the semantic differential technique in an attempt to resolve the following questions:

1. Are there significant differences between achievers and under-achievers in perceived meaning as shown in their respective rating of selected achievement-related concepts for each of the seven areas listed below?
    a. school experience
    b. family relationships
    c. social relationships
    d. self-concept
    e. authority relationships
    f. goal orientation
    g. moral and social values

2. Does a pattern of characteristics distinguishing achievers from under-achievers appear to exist, with respect to differences in semantic distances between selected pairs of achievement related groups?

3. Do the perceived meanings as shown in the ratings of the selected concepts vary along more than one dimension for achievement, intelligence and sex groupings?

4. To what extent does intellectual ability contribute to the differences in perceived meaning as shown in the ratings of selected concepts?

5. To what extent does sex influence perceived meaning as shown in the ratings of these achievement-related concepts?

His subject population consisted of 1,114 students in the ninth grade. They were considered to be middle-class, Anglo-American. Twelve distinct groups were formed from the achievement level, intelligence level, and sex. An expected achievement level in reading was determined from their scores on the California Test of Mental Maturity. The actual reading level was determined by administering the California Achievement Test. Under-achievers were those students who were one or more years lower in reading ability than would be expected and achievers were those not classified as under-achievers.

Intelligence levels were established from CTMM scores low IQ below 91, average IQ between 91 and 110, and high IQ above 110.

Concepts used were selected to represent each of the seven areas presented. School experience was represented by teachers, grades, school, reading, and ideal teacher; family relationships by home, ideal parent, and parents; social relationships by most people, my best friends, class-mates, and grownups; self-concept by my school ability, how I'd like to be, and how my class sees me; authority relationships by authority, rules, and punishment; goal orientation by future, college, a job, graduating, quitting school, money, and success; moral and social vlaues by trying hard, cheating, something easy, and something important. Polar pairs were chosen from studies reported by Osgood (1957) on the basis of high factor loadings on three factors -- evaluation, potency, and activity, which were identified by factor analysis of experimental scales.

Evaluation was represented by sweet-sour, fair-unfair, and pleasant-unpleasant; activity by fast-slow, sharp-dull, and active-passive; potency by heavy-light, strong-weak, and large-small.

A seven-point scale was used between each polar pair. Scores were obtained by summing the polar pairs for each factor (evaluative, potency, and activity) under each concept. Distance scores on certain concepts were obtained following the procedure recommended by Osgood (1957). The scores for each of the twelve groups were compared on each concept through the analysis of variance technique.

The following concepts were found to discriminate significantly between achievers and under-achievers above the .05 level of confidence: grades, reading and my school ability on the evaluative, potency, and activity factors; *ideal teacher*, *college* and *quitting school* on the evaluative and activity factors; *future*, *graduating* and *success* on the evaluative factor; *authority* and *something important* on the potency factor; and, *me*, *how my class sees me* and *cheating* on the activity factor. The concepts *quitting school*, *cheating* and *a job* were negatively discriminating in that non-achievers have larger scores than do achievers. The other concepts on the semantic differential scale did not discriminate at a significant level, although most of them indicated trends in the same direction as those concepts which did significantly discriminate. Rosenthal found significant differences in the manner in which males and females responded to concepts on his semantic differential scale. He also found that subjects who were termed high in intelligence showed significant differences in the manner in which they responded to many concepts when contrasted with students termed low in intelligence. He concluded that intelligence and sex were factors which affected the manner of response to his semantic differential scale.

Among Rosenthal's (1965) major conclusions were the following: (1) The semantic differential technique was a useful tool in assessing the motivational and attitudinal aspects of achievement and underachievement. (2) The results furnished additional support for the necessity of adopting a multivariable approach to the study of underachievement. The failure of the individual to achieve academically at a level commensurate with his ability was revealed by his underlying attitudes toward himself, toward his environment, and toward others and was expressed in terms of his perceptions of relevant concepts which have been found to have significance for academic achievement. (3) No attempt to diagnose or predict under-achievement could be made with the instrument in its present form. However, with continued research and refinement the diagnostic and predictive ability of the instrument might prove to be of considerable value to teachers and counselors.

Summary

From the review of the pertinent research, the conclusion that presently used predictive instruments are not very satisfactory seems warranted. The semantic differential as a technique for predicting achievement has not been thoroughly investigated. Logically and theoretically, the semantic differential would seem to be an appropriate technique for measuring the motivational concepts which are believed to play a large part in student achievement.

The next chapter will present the rationale on which the semantic differential was based and the design and procedures followed in the experiment.

CHAPTER 2

THE SEMANTIC DIFFERENTIAL, EXPERIMENTAL DESIGN, AND PROCEDURES

The purposes of this investigation were to explore the ability of the semantic differential technique to (1) discriminate between those students having the same academic ability by indicating those who will make high grades and those who will make low grades; and, (2) combine with existing academic aptitude scores as a better predictive device than either measure can provide separately. The semantic differential technique is discussed and the experimental design and the procedures are presented in this chapter.

General Design

The general design of the study may be summarized as follows: (1) The hypotheses to be tested must be stated. (2) The rationale of the semantic differential must be presented. (3) The semantic differential scale to be used in the investigation must be constructed. (4) The statistical methods must be determined. (5) The subjects to whom the scale is to be administered must be identified. (6) The scales must be administered; and then after an appropriate time lapse, the scale must be re-administered to a random sample of the student population in order to determine the reliability of the scales. (7) Academic aptitude of each student must be determined. (8) End-of-semester grades must be collected for each student. (9) Statistical treatment of the data must be performed. (10) The data must be analyzed. (11) Conclusions must be drawn. (12) The final report must be prepared.

The remainder of this chapter will discuss the parts of the investigation listed above.

Hypotheses

The following null hypotheses were posed for statistical testing:

1. There are no significant relationships between scores on the semantic differential scales devised for this study and grade point averages of students who have the same *ACT* scores.

2. A combination of semantic differential scores and *ACT* scores does not predict significantly better than either measure will predict alone.

Although not stated as a hypothesis the question of differential responses by males and females to the semantic differential scale will be studied.

The Semantic Differential Technique

The semantic differential technique is an attempt to measure meaning by using multi-dimensional discriminations of language behavior. If meaning is conceived as an internal psychophysical event, then it must take on some of the properties of physiological mediation underlying the sensory functions as studied in traditional psychophysics. Because sensory experiences are known to vary in kind and amount, meaning must also vary qualitatively and quantitatively.

Osgood, Suci, and Tannenbaum (1957) devised the semantic differential technique in an attempt to determine the qualitative and quantitative aspects of meaning. This technique allows a respondent to mark on a continuum his evaluation of a concept. Osgood used a seven point scale as his continuum and could by this procedure quantify the meaning which the concept had for the respondent on the particular continuum. As many different continua as necessary could be used to define the range of meaning of the concept for the respondent. The semantic differential technique is in effect a method of controlled association using scaling procedures to define meaning operationally. The semantic differential is an indirect method of measuring meaning in the same sense that an intelligence test does not assess intelligence *per se*. Wherein an intelligence test attempts to place the respondent on a single continuum, the semantic differential technique makes use of the assumption that meaning is multi-dimensional, the number and intensity of the dimensions for an individual, depending upon his past experience.

Factor analytic studies of meaning conducted by Osgood and associates (1957) identified three factors or dimensions of meaning which appear to be persistent and stable. The factors which were labeled evaluation, potency, and activity accounted for about sixty per cent of the reliable variance with the evaluative factor accounting for about one-half of the sixty per cent. Polar pairs (adjective continuum scales) corresponding to each factor were identified by Osgood and were listed with their respective loading on each factor. It is possible, therefore, to select polar pairs which have a maximum leading on one factor and minimum loadings on the other factors. In most semantic differential scales, polar pairs representing each of the three factors--evaluation, potency, and activity--are included.

An example of a semantic differential scale as applied to the concept Mother follows:

MOTHER

good_____,_____,_____,_____,_____,_____,_____bad

slow_____,_____,_____,_____,_____,_____,_____fast

strong_____,_____,_____,_____,_____,_____,_____weak

The concept is place in the center above the polar pairs, and the respondent is urged to mark the polar pair scale in keeping with the direction and intensity which he feels for the concept. The scale is then scored for each polar pair by assigning values ranging from one to seven between the polar pairs, the seven is assigned to the space next to the most desirable of the two adjectives, and each space further away is assessed one less number so that the space next to the least desirable adjective is scored one. The score on each concept is determined by summing the polar pairs which related to each factor used. The directions to the student include the admonition to work rapidly in marking the degree of intensity which comes most readily to mind. Miron (1961) found that test-retest reliability was higher when students were encouraged to work rapidly.

Reliability of the technique

The usual method of determining reliability of a semantic differential scale is the test-retest method. Osgood (1957); Jenkins, Russell, and Suci (1958, 1959); Norman (1959); and Miron (1961) have all reported reliability coefficients determined from mean scores ranging from the high .70's upward. Since these studies are almost universally quoted when the question of reliability of a semantic differential scale is considered, these studies are not recounted here. Other studies which are more recent and which illustrate the reliability of the semantic differential technique were reviewed.

Green (1964) checked the reliability by administering his semantic differential scale to forty-five seventh grade boys. Six weeks later the scale was re-administered. The reliability coefficients for the evaluative factor on the concepts Me, Mother, and Father were .91, .89, and .91 respectively; the potency coefficients were .83, .90, and .88 respectively; and the activity coefficients were .86, .77, and .88 respectively. The level of significance for the coefficients was not stated; but since they are relatively high and the number of subjects is adequate, significance seems assured.

The reliability of a semantic differential scale was used by Marks (1965) to differentiate between psychiatric and normal patients on the meaning of personal and emotional concepts. The test-retest method and two time differentials--one week and seven months were used. For the normal patients the correlations on the evaluative factor and emotional concepts were .93 for one week and .87 for seven months; for the evaluative factor and the personal concepts the coefficients were .84 for one week and .71 for seven months. All of these coefficients were significant at the .001 level of confidence. Marks concluded that the evaluative factor evidenced high stability for the concepts used. The coefficients for the activity and potency factors reached the .001 level of significance (with one exception), but the coefficients were not high enough to indicate stability for either personal or emotional concepts for either time period. Marks concluded that some of the variation in reliability which occurred between the factors could probably be explained by the greater number of scales used for the evaluative factor. Five scales were used for the evaluative factor, four for the potency factor, and only two for the activity factor. Marks also noted that the concepts showed greater instability than did the combined concept scores.

Leach (1966) used both split-half with the Spearman-Brown prophecy formula and the test-retest methods to check the reliability of his Temperment-Translation Scales (a four part semantic differential scale having separate score summations for concepts dealing with emotional stability, sociability, personal relations, and thoughtfulness). The reliability coefficients for the test-retest method (n = 23) were .62 for evaluation, .85 for potency, and .90 for activity on the emotional stability scale; .83 for evaluation, .86 for potency, and .54 for activity on the sociability scale; .69 for evaluation, .76 for potency, and .82 for activity on the personal relations scale; and .61 for evaluation, .83 for potency, and .57 for activity on the thoughtfulness scale. The results of the split-half method as extended (n = 144) were .62 for evaluation, .65 for potency, and .66 for activity on the emotional stability scale; .81 for evaluation, .68 for potency, and .24 for activity for the sociability scale; .89 for evaluation, .81 for potency, and .82 for activity for the personal relations scale; and, .79 for evaluation, .45 for potency, and .59 for activity for the thoughtfulness scale. Leach concluded that the coefficient for the activity factor on the sociability scale was so low that its reliability was suspect. The other scales "...possess reliability of sufficient magnitude for practical measurement purposes." (p. 113)

Since there is no "the" semantic differential scale and because each reliability study was conducted on a scale originated by the investigator to be used in his own unique study, the reliability found for one scale has no real relationship to the reliability of another scale. However, the over-all reliability for the vast majority of scales is universally high; therefore, a scale which is constructed thoughtfully and carefully should have sufficient reliability to be useful, but the reliability of each instrument must be uniquely determined.

Construction of the scale

Osgood (1957) stated that the construction of any semantic differential scale must be adapted to the research problem to which the scale is to be applied. The selection of the concepts and polar pairs for use in a particular study depends upon the purposes of the research. The investigator simply uses "good judgment" with respect to his problem. He should select concepts on which he can expect considerable individual differences to be shown, concepts which have only a unitary meaning for the subjects, and concepts which are familiar to all subjects. The evaluative, potency, and activity factors accounted for over half the variance in several factor analytic studies; therefore when a multi-dimension study is made, these are the factors which should be utilized. Ideally only one polar pair which would be perfectly reliable should be used. Since no polar pair is perfectly aligned or perfectly reliable, about three polar pairs per factor, nine per concept, are normally used. Polar pairs should be chosen so that they load maximally one factor and minimally the other two factors.

The construction of the semantic differential scale used in this study followed the procedures stated above. The concepts used were chosen from a large list of concepts concerning achievement motivation gleaned from professional literature, a thesaurus, dictionaries, and other diverse sources. This list was studied with the aid of a jury consisting of colleagues in the psychology field, and the final concepts were chosen with the expectation that they would discriminate between those students likely to achieve high grades and those students who would not be likely to achieve high grades. The concepts chosen were academic honor society, future, me as I would like to be, me as I am, achievement, tests, failure, cheating, studying, college graduate, quitting school, and reading. The polar pairs were selected from Osgood and were those identified through factor analysis as having the highest loadings on the evaluative, potency, and activity factors. The polar pairs chosen to represent the evaluative factor were as follows: good-bad, beautiful-ugly, and nice-awful; for the potency factor: large-small, heavy-light, and strong-weak; for the activity factor: dull-sharp, passive-active, and slow-fast.

The concepts were presented two per page and were assigned to their respective positions by drawing them from a hat. Polar pairs were also randomized as to sequence and as to direction. This randomization procedure was recommended to reduce possible transfer effect in marking.

Subjects

The subjects consisted of students enrolled in twelve sections of freshman orientation. An attempt was made to include the entire freshman enrollment of the fall of 1967; however the week scheduled for the administration of the scale was extremely cold, and the highways were icy. Many commuting students were absent on the day when they were scheduled to take the scale. No attempt was made to secure scores from absent students. Absences, incomplete data, or incorrectly marked scales reduced the total number of subjects to 944, of which 524 were male and 420 were female. The age and academic aptitude characteristics are present in Table I. Comparison of these students with former freshman groups indicate that they are typical of past freshman classes enrolled at Northeastern State College.

TABLE I

AGE AND APTITUDE CHARACTERISTICS OF SUBJECTS

	Academic Aptitude*			Age	
Group	M	σ	Range	M	Range
Females N = 420	16.76*	4.50	4-28*	18 yrs., 3 mons., 5 days	17 yrs., 5 mons., --45 yrs.
Males N = 544	17.51*	4.84	3-30*	18 yrs., 7 mons., 25 days	17 yrs., 2 mons. --40 yrs., 6 mons.
Total N = 944	17.18*	4.69	3-30		

* *American College Testing Program* (ACT) scores

Administration of the scale

The semantic differential scale devised for use in this investigation was administered by the investigator to eight of the classes--two classes for each of the four orientation instructors. Each orientation instructor administered the scale to the last of his three classes. The scales were administered during the second week in January. Some students who had entered Northeastern State College as freshmen had withdrawn prior to this time and were therefore not available for inclusion in the subject population. Since the criterion of achievement was the grade point average at the end of the fall semester, little could have been gained by administering the scales to students for whom this grade point average was not available.

Scoring of the Scale

The seven point system recommended by Osgood (1957) was utilized, and scoring was done by hand. Scores were determined for the evaluative, potency, and activity factors for each concept; additionally a fourth score was obtained by summing the three factor scores on each concept. The latter procedure is neither recommended nor prohibited by Osgood, but it is commonly used.

Statistical procedure

The statistical procedure was not formulated at the time the original precis was submitted. As specified in the precis, the data obtained from the administration of the semantic differential scale were to be processed by the method which would best determine the value of the data in predicting achievement. After a discussion of the issues with consultants of the Oklahoma State University Computer Center where the data was processed, a step-wise regression procedure was adopted. This procedure yields the means of all concepts, correlations between concepts, correlations between concepts and criterion, standard errors, and F values. This procedure also yields Beta weights for formulating regression equations with which to predict the criterion score. As many regression equations as there are variables (concepts in this study) can be formulated, since the first regression equation presented contains only one variable, the second regression equation contains two variables, etc. The order of presentation of variables in the regression equation is based on the extent to which the variable contributes to the overall ability of the equation to predict the criterion score. The variable contributing most is presented first, the variable contributing the second most is presented second, etc. The addition of each variable is referred to as a "step." Each step is accompanied by a multiple correlation coefficient showing the degree to which the combined variables included through this step relate to the criterion score. Standard errors and F values are also included for each step. The advantage of this technique is obvious in that multiple regression equations can be terminated at a point where the use of additional variables ceases to increase the degree of forecasting efficiency. The technique also uses all variables to predict a student grade and then contrasts the predicted grade with the attained grade.

In the step-wise regression technique several different factors may be used to determine the order in which concepts enter the regression equation. For this study partial correlations were utilized. The technique has been criticized from the standpoint of validity in that if enough simple correlations are generated, a high multiple correlation can be obtained even if the data are absolutely random. If the data meet the assumption of continuity and if a number of repeat patterns are obtained, then the data would not be considered random and therefore the problem of validity is resolved.

The step-wise regression technique was applied to grouped male and female students with the evaluative, potency, and activity factors treated separately; the factor scores were then combined for each concept into a total score which was subjected to the same statistical treatment. Male and female scores were treated separately in the study, since earlier studies indicated that prediction based on a combination of male and female semantic differential scores was not as high as prediction based on scores from separate male and female groups.

Students having the same academic ability will not necessarily make the same grade point average. A regression analysis of selected academic aptitude levels was computed to determine whether the semantic differential scale used in the study would identify the extent to which students of equal academic ability were likely to differ in achievement. The researcher believed that the academic aptitude level could differentially affect the extent to which the semantic differential scale would discriminate between high and low achieving students of the same ability level; therefore three levels of academic aptitude were chosen based on the students' ACT scores.

These levels were twenty-two, which is just above one standard deviation above the mean for Northeastern State College freshmen; seventeen, which is the score nearest the mean; and twelve, which is just under on standard deviation below the mean. Male and female groups based on these criteria were treated as outlined above.

There is the possibility that the semantic differential scale can be combined with known academic aptitude scores (in this case ACT scores), and the combination will predict achievement better than either measure will predict individually. To test this hypothesis, the ACT scores were combined as another factor in a regression analysis. Other procedures were identical with those outlined earlier.

The question of male-female differentiation in response to the scale was investigated by use of the standard error of the multiple correlation.

Summary

Semantic differential scales measuring concepts dealing with academic achievement were formulated and administered to beginning freshmen during the fall term of 1967. A reliability study of the scale was made by readministering the scales to a selected random sample of students. Scoring of the scales was accomplished by applying a seven-point scale to the polar pairs and summing the values of the polar pairs corresponding to the evaluative, potency, and activity factors under each concept; a total score was also obtained by summing the factor scores for each concept. A step-wise regression technique was used as the statistical treatment. Male and female students were grouped separately, since previous research indicated a sex difference with respect to answers on semantic differential scales. In addition to general regression analysis for male and female students, students having _ACT_ scores of seventeen, twelve, and twenty-two were treated separately to determine the extent to which the semantic differential scale could predict differential achievement between students having the same academic aptitude score at average, low, and high aptitude levels. The semantic differential scores were combined with _ACT_ scores to determine whether the combination could enable better prediction than could either scale by itself.

In the next chapter, the statistical procedures are applied to the data and the findings are presented and discussed.

CHAPTER 3

FINDINGS

In this study acceptance or rejectance was sought for the following null hypotheses:

1. There are no significant relationships between scores on the semantic differential scales devised for this study and grade point averages of students who have the same ACT scores.
2. A combination of semantic differential scores and ACT scores does not predict significantly better than either measure will predict alone.

Additionally, the study sought to determine the reliability of the semantic differential scale devised for the study, and to determine whether sex differences exist with respect to semantic differential scale answers.

This chapter will present the statistical analysis of obtained data pertaining to these basic questions.

Statistical Procedures

The statistical procedure used to compare semantic differential scale scores with the criterion--grade point average--was the stepwise regression technique. The scales were hand scored and the data thus derived was processed by the Oklahoma State University Computer Center. Statistics furnished by the center included means, correlations between concepts, correlations between concepts and the criterion, standard errors, F values for Beta weights, and Beta weights for each variable as it enters into a regression equation. Regression equations of the form $Y = Bo + B_1X_1 \ldots B_nX_n$ were formulated for each group specified in the study. The equations were terminated at the point where the F value with its respective degrees of freedom indicated that the next variable did not contribute significantly to the ongoing value of the equation. The terminal multiple correlation as derived by each regression equation was checked for its significance by the use of the formula for F with respect to multiple correlation found in Ferguson (1966, p. 401):

$$F = \frac{R^2}{1 - R^2} \quad X \quad \frac{N - k - 1}{k}$$

where N is the number of observations, R is the multiple correlation, and k is the number of independent variables. A standard F table is entered with k the value of the degrees of freedom for the numerator, and N - k - 1 for the denominator. Significance was checked at the .01 and .05 levels of confidence.

The question of difference between male and female answers on the semantic differential scale was checked by using Garrett's (1966, p. 416) formula for the SE with respect to multiple correlation:

$$SE_R = \frac{1 - R^2}{N - m}$$

where R is the multiple correlation, N is the number of observations, and m is the number of variables. The standard error thus determined was then multiplied by the normal curve value for the .05 level of confidence (1.96) and the result added to and subtracted from the multiple correlation. The companion correlation from a pair of male-female multiple correlations was given the same treatment. The extended correlations are then compared; if an overlap in value occurs, the samples from which the multiple correlations are computed seemingly originate within the same or a similar population; if no overlap occurs then a significant difference is believed to exist between the parent populations at the .05 level of confidence.

The question of scale reliability was studied by the test-retest method in which students were given the same scales with an intervening time period. The results of each administration were correlated and the significance of the correlation was determined by using a "t" test. Since the question of scale reliability is of prime importance to the remainder of the study, the findings concerning reliability were presented first.

Reliability

The reliability of the semantic differential scale used in this study was determined by randomly choosing three orientation classes (N - 72) and using the test-retest method with a one-week time interval between administrations. Scores were summed across concepts into evaluative, potency, and activity factor scores, and a total score consisting of the summation of all scores. Product moment correlations and "t" tests were computed for each factor and the summation. The results are shown on Table 2. The correlation for the evaluative factor was .796 for the potency factor .601, for the activity factor .850, and for the summation .817. All correlations were significant above the .001 level of confidence. The reliability of the scales is of sufficient magnitude that further study seems warranted.

TABLE 2

TEST-RETEST RELIABILITY OF THE SEMANTIC DIFFERENTIAL SCALE FOR THE EVALUATIVE, POTENCY, AND ACTIVITY FACTORS AND THE TOTAL SUMMATION SCORE

	Evaluative		Potency		Activity		Total	
	test	retest	test	retest	test	retest	test	retest
Mean	161.09	161.53	158.15	159.76	165.92	165.43	485.17	486.99
s	16.56	16.78	15.86	16.07	18.05	17.67	45.51	42.16
r	.796		.601		.850		.817	
t	11.00*		6.29*		13.50*		11.86*	

N = 72 df = 70 *all significant above the .001 level of confidence.

Hypothesis 1

A major purpose of this study was to determine the extent to which the scale devised for the study would discriminate in grade prediction between students having equal academic ability. To investigate this question the semantic differential scale scores of groups of students having _ACT_ scores of 12, 17, and 22 with each _ACT_ level further subdivided into male and female components, were each subjected to separate step-wise regression analysis for the evaluative, potency, activity and total factor scores.

Evaluative factor

A significant multiple correlation (R = 0.698**) was found for males of _ACT-12_ (N = 23). Two concepts (variables) contributed significantly to the multiple regression equation: tests** and studying*. The males of _ACT-17_ (N = 33) had an R = 0.483* with the concepts _achievement_*** and _me as I would like to be_* contributing.

*** non-significant
** significant at the .01 level of confidence
* significant at the .05 level of confidence

The concept achievement was non-significant but entered first and therefore must be included in the regression equation which yielded a significant R. A significant R was not found for males of ACT-22.

The females of ACT-12 (N = 20) had no significant R. Females of ACT-17 (N = 27) had an R = 0.494* with only the concept failure** contributing.

The data for these groups are found in Table 3 and Appendix B.

TABLE 3

EVALUATIVE FACTOR FOR 12, 17, and 22 ACT LEVELS

ACT Level	N	df	Cut-off R[1]	Variables entering at significant level	Maximum R (12 variables)
Males					
12	23	2,20	0.698**	tests**	0.816
17	33	2,30	0.483*	achievement*** me as I would like to be*	0.701
22	21		none	none	0.665
Females					
12	20		none	none	0.755
17	27	1,25	0.494*	failure**	0.594
22	14	2,11	0.752*	studying** me as I am*	0.998

***non-significant
**significant at the .01 level of confidence
* significant at the .05 level of confidence
[1] Multiple correlation coefficiant cut-off at point where additional variables do not add significantly.

Potency factor

Males of *ACT-12* (N = 23) had an R = 0.774**with the concepts *academic honor society****, *cheating**, *reading**, and *me as I am** contributing. Males of *ACT-17* (N = 33) had an R = 0.431** with only the concept *academic honor society** contributing. A significant R for males of *ACT-22* was not found.

Females of *ACT-12* (N = 20) had an R = 0.797** with the concepts *academic honor society****, *future**, *me as I'd like to be**, and *quitting school** contributing. Females of *ACT-17* (N = 27) had an R = 0.383* with only the concept *achievement** contributing. Females of *ACT-22* (N = 14) had an R = 0.824** with the concepts *tests*** and *me as I'd like to be** contributing.

Data for these groups on the potency factor are found in Table 4 and Appendix B.

Activity factor

The only significant R found for the activity factor was from female *ACT-12* (N = 20) which had an R = 0.490* with only the concept *future** contributing. Data for these groups on the activity factor are found in Table 5 and Appendix B.

Factor summation

No significant R's were found for males of *ACT-12* and *ACT-17*. The entry R for males of *ACT-22* was significant at the .05 level of confidence but no concept had an *F* value sufficiently great to allow it to enter a regression equation at a significant level.

*** non-significant
** significant at the .01 level of confidence
* significant at the .05 level of confidence

TABLE 4

POTENCY FACTOR FOR 12, 17, and 22 ACT LEVELS

ACT Level	N	df	Cut-off R^1	Variables entering at significant level	Maximum R (12 variables)
Males					
12	23	4,18	0.774**	academic honor society*** cheating** reading*	0.859
17	33	1,31	0.431**	academic honor society*	0.642
22	21	none	none	none	0.764
Females					
12	20	4,15	0.797**	academic honor society*** future* me as I'd like to be* quitting school*	0.870
17	27	1,25	0.383*	achievement*	0.660
22	14	2,12	0.824**	tests** me as I'd like to be*	1.000

*** non-significant
** significant at the .01 level of confidence
* significant at the .05 level of confidence
[1] Multiple correlation coefficient cut-off at point where additional variables do not add significantly.

Females of ACT-12 (N = 20) had an R = 0.866** with the concepts future*, me as I am***, reading*, cheating***, and academic honor society* contributing. Females of ACT-22 (N = 14) did not have an R which was significant.

*** non-significant
** significant at the .01 level of confidence
* significant at the .05 level of confidence

Data for these groups are found in Table 6 and Appendix B.

TABLE 5

ACTIVITY FACTOR FOR 12, 17, and 22 ACT LEVELS

ACT Level	N	df	Cut-off R^1	Variables entering at significant level	Maximum R (12 variables)
Males					
12	23	none	none	none	0.713
17	33	none	none	none	0.742
22	21	none	none	none	0.616
Females					
12	20	1.18	0.490	future*	0.318
17	27	none	none	none	0.675
22	14	none	none	none	0.999

*significant at the .05 level of confidence

[1] Multiple correlation coefficient cut-off at point where additional variables do not add significantly.

Discussion

The regression analysis of the semantic differential scale scores yielded multiple correlations which were significant at or greater than the .05 level of confidence for the male and female subjects of the 12, 17, and 22 ACT score levels investigated. However, not all factors discriminated for all groups; and in one instance--the males of the 22 ACT score level--the entry multiple correlation was significant but no concept entered into the regression equation at a significant level.

TABLE 6

TOTAL FACTORS FOR 12, 17, and 22 ACT LEVELS

ACT Level	N	df	Cut-Off R^1	Variables entering at significant level	Maximum R (12 variables)
Males					
12	23		none	none	0.706
17	33		none	none	0.624
22	21		0.354*	none	0.667
Females					
12	20	5,14	0.866*	future* me as I am*** reading* cheating*** academic honor society*	0.919
17	27	5,21	0.839**	failure** cheating*** college graduate*** tests*	0.887
22	14		none	none	0.796

*** non-significant
** significant at the .01 level of confidence
* significant at the .05 level of confidence
[1] Multiple correlation coefficient cut-off at point where additional variables do not add significantly.

Since relationships significant at or above the .05 level of confidence were found between grades and semantic differential scale scores for the various groups used in the investigation of Hypothesis 1, this hypothesis stated in the form of a null hypothesis must be rejected and the alternate hypothesis accepted. Significant relationships do exist between semantic differential scores and grade point averages of students having the same ACT scores.

Discussion of concepts--Hypotehsis 1.

All twelve concepts entered into the regression equations computed from data from the ACT 12, 17, and 22 levels. Only one concept entered as many as four times--academic honor society--and two of the four times it entered at a non-significant level but entered before a significant concept and therefore was included in the appropriate regression equation. Only two concepts entered as few as one time each--quitting school and college graduate. The concept college graduate was non-significant. Those concepts entering three times were tests, cheating, me as I am, failure, future, and me as I'd like to be. The concept tests was the most effective predictor in that two of the three times it entered it was significant at the .01 level of confidence; no other concept was significant at this level more than once.

In this portion of the study, the potency factor had twelve concepts entering regression equations with two significant at the .01 level of significance, eight significant at the .05 level of confidence, and two which were non-significant. The summation of factors scale had ten concepts entering of which one was significant at the .01 level of confidence, six were significant at the .05 level of confidence, and three were non-significant. The evaluative factor had seven concepts which entered the regression equation of which two were significant at the .01 level of confidence, four were significant at the .05 level of confidence, and one was non-significant. The activity factor had only one concept which was significant as high as the .05 level of confidence.

A summarization of the number and significance of concepts which entered into regression equations for each ACT level by sex discloses that male-ACT-12 had three concepts significant at the .05 level of confidence and one concept non-significant for the potency factor, one concept significant at the .05 level of confidence, and one non-significant concept for the evaluative factor. There were no significant concepts for the male-ACT-22 group. The female-ACT-12 had three concepts significant at the .05 level of confidence and one non-significant concept for the potency factor; one concept was significant at the .05 level of confidence for the activity factor, and three concepts were significant at the .05 level of confidence, while two concepts were non-significant for the summation of factors scores. Female-ACT-17 had one concept significant at the .01 level of confidence for the potency factor; one concept significant at the .01 level of confidence for the evaluative factor; and, one concept significant at the .01 level of confidence, three concepts significant at the .05 level of confidence, and one non-significant concept for the summation of factors scores. Female-ACT-22 had one concept significant at each the .01 and .05 levels of confidence for the potency factor, and one concept significant at each the .01 and .05 levels of confidence for the evaluative factor.

Data for this section are presented in Table 7.

Hypothesis 2

A second purpose of this study was to determine if the scale devised for this study could be combined with the ACT scores and thus be a better instrument of prediction than either the ACT or the semantic differential scale alone. To test this hypothesis, the ACT was added to the step-wise regression analysis as another variable and the same statistical procedures used in testing the first hypothesis were followed. The scores of the males and females were analyzed separately and were then added together and analyzed as a total group.

TABLE 7

CONCEPTS--SIGNIFICANCE LEVELS AND GROUPS FOR WHICH THEY PREDICT

Concept		Group
Academic honor society	Potency	Male-ACT-12***
		Female-ACT-12***
		Male-ACT-17*
	Total	Female-ACT-12*
Cheating	Potency	Male-ACT-12*
	Total	Female-ACT-12***
		Female-ACT-17*
Tests	Potency	Female-ACT-22**
	Evaluation	Male-ACT-12**
Me as I am	Potency	Male-ACT-12*
	Evaluation	Female-ACT-22*
	Total	Female-ACT-12***
Me as I'd like to be	Potency	Female-ACT-12*
		Female-ACT-22**
	Evaluation	Male-ACT-17*
Future	Potency	Female-ACT-12*
	Total	Female-ACT-12*
		Female-ACT-17*
Studying	Evaluative	Male-ACT-12*
		Female-ACT-22*
Failure	Evaluative	Female-ACT-17**
	Total	Female-ACT-12*
	Activity	Female-ACT-12*
Reading	Potency	Male-ACT-12*
	Total	Female-ACT-12*
Achievement	Potency	Female-ACT-17*
	Evaluation	Male-ACT-17***
Quitting school	Potency	Female-ACT-12*
College graduate	Total	Female-ACT-17***

* significant at .05 level of confidence
** significant at .01 level of confidence
*** non-significant

The *ACT* score was the most important factor and entered each regression equation first. The correlation coefficient between the grade point average and *ACT* scores for 524 males was 0.493; for 420 females it was 0.529, and for 944 males and female subjects it was 0.500.

Males

For the evaluative factor and the male group, the cut-off R was 0.530** which was a zero-order improvement of .037 correlation points. The concepts which entered the regression equation were the *ACT-score tests***, and *achievement***. The potency factor and the male group yielded an R of 0.508** which was a zero-order improvement of 0.015 correlation points. Two concepts entered the regression equation--*ACT scores***, and *studying***.

The activity factor and the male group yielded an R of 0.520** which was a zero-order improvement of 0.027 correlation points. Three concepts entered the regression equation--*ACT score***, achievement**, and *studying**. The factor summation scores and the male group yielded an R of 0.532** which was a zero-order improvement of 0.039 correlation points. Six concepts entered the regression equation-*ACT-scores***, *tests***, *achievement***, *me as I would like to be***, *academic honor society***, and *studying***. The data for the male group are found in Table 8 and Appendix C.

** significant at the .01 level of confidence
 * significant at the .05 level of confidence

TABLE 8

MULTIPLE CORRELATION COEFFICIENTS FOR EVALUATIVE, POTENCY, ACTIVITY AND FACTOR SUMMATION SCORES COMBINED WITH ACT SCORES FOR 524 MALE SUBJECTS

Factor	df	Cut-off R^1	Variables entering at significant level	Maximum R (13 variables)
Evaluative	3,520	0.530**	ACT** tests** achievement**	.540
Potency	2,521	0.508**	ACT** studying**	0.521
Activity	3,520	0.520**	ACT** achievement** studying*	0.573
Total	6.517	0.532**	ACT** tests** achievement** me as I'd like to be** academic honor society** studying**	0.540

* significant at the .05 level of confidence
** significant at the .01 level of confidence
[1] Multiple regression coefficient cut-off at point where additional variables do not add significantly.

Females

The evaluative factor and the female group yielded an R of 0.608** which was a zero-order improvement of 0.016 correlation points. Two concepts entered the regression equation--ACT-scores**, and studying**. The potency factor and the female group yielded an R of 0.613 which was a zero-order improvement of 0.021 correlation points. Three concepts entered the regression equation--ACT-scores**, studying**, and academic honor society*.

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*significant at the .05 level of confidence
**significant at the .01 level of confidence
***non-significant

The activity factor and the female group yielded an R of 0.616 which was a zero-order improvement of 0.024 correlation points. Three concepts entered the regression equation--*ACT-scores***, *studying***, and *tests**. The factor summation scores and the female group yielded an R of 0.612 which was a zero-order improvement of .02 points. Two concepts entered the multiple regression equation--*ACT-scores***, and *studying***. The data for the female group is found in Table 9 and Appendix C.

TABLE 9

MULTIPLE CORRELATION COEFFICIENTS FOR EVALUATIVE, POTENCY, ACTIVITY, AND FACTOR SUMMATION SCORES COMBINED WITH *ACT* SCORES FOR 420 FEMALE SUBJECTS

Factor	df	Cut-off R[1]	Variables entering at significant level	Maximum R (13 variables)
Evaluative	2.417	0.608	ACT** studying**	0.624
Potency	3,416	0.613**	ACT** studying** academic honor society**	0.618
Activity	3,416	0.616**	ACT** studying** tests**	0.630
Total	2,417	0.612	ACT** studying**	0.620

** significant at the .01 level of confidence

[1] Multiple correlation coefficient cut-off at the point where additional variables do not add significantly.

Total subjects

The evaluative factor and total subject yielded an R of 0.539** which was a zero-order improvement of 0.039 correlation points. Five concepts entered the regression equation--ACT-scores**, achievement**, future**, cheating**, and tests**. The potency factor and total subjects yielded an R of 0.553** which was a zero-order improvement of 0.053 correlation points. Four concepts entered the regression equation--ACT-score**, me as I would like to be**, studying**, and achievement**.

The activity factor and the total subjects yielded an R of 0.538** which was a zero-order improvement of 0.038 correlation points. Five concepts entered the regression equation--ACT-scores**, academic honor society**, studying**, achievement**, and me as I would like to be**. The factor summation scores and total subject yielded an R of 0.550** which was a zero-order improvement of 0.050 correlation points. Five factors entered into the regression equation--ACT-scores**, studying**, me as I would like to be**, achievement**, and academic honor society**. Data for total subjects are found in Table 10 and Appendix C.

Discussion

Semantic differential scale scores added to the ACT scores enabled a multiple-correlation coefficient which was higher than that produced by the ACT alone to be computed. This coefficient was significantly higher at or above the .01 level of confidence for each factor involved. Since the ACT score entered the regression equation first and provided the maximum relationship to the criterion it is superior to the semantic differential scale as a predictor. However, the semantic differential scale combined

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**significant at the .01 level of confidence with the ACT produced multiple-correlations which in each instance were significantly higher. The null hypotehsis must be rejected. ACT-scores combined with semantic differential scale scores can predict at a significantly higher level than can either predictor alone.

TABLE 10

MULTIPLE CORRELATION COEFFICIENTS FOR EVALUATIVE, POTENCY, ACTIVITY AND FACTOR SUMMATION SCORES COMBINED WITH ACT SCORES FOR 944 SUBJECTS

Factor	df	Cut-off[1] R	Variables entering at significant levels	Maximum R (13 variables)
Evaluative	5,938	0.539**	ACT** achievement** future** cheating** tests**	0.546
Potency	4,939	0.553	ACT** me as I'd like to be** achievement** studying**	0.558
Activity	6,937	0.538	ACT** academic honor society** studying** achievement** me as I'd like to be**	0.543
Total	5,938	0.550	ACT** studying** me as I'd like to be** achievement** academic honor society**	0.556

** significant at the .01 level of confidence

[1] multiple regression equation termined at point where additions variables do not add significantly

Discussion of concepts--Hypotehsis 2

The concepts which were significant predictors for the total male, total female, and combined total male and female groups are presented in Table 11. All concepts but studying on the activity factor for males, were significant at the .01 level of confidence; studying for this group and on this factor was significant at the .05 level of confidence.

TABLE 11

CONCEPTS, SIGNIFICANCE LEVELS, AND THE GROUPS FOR WHICH THEY PREDICT

Concepts	Total subjects N = 944	Male N = 524	Female N = 420
ACT	eveluative potency activity total	evaluative potency activity total	evaluative potency activity total
achievement	evaluative potency activity total	evaluative activity total	
future	evaluative		
cheating	evaluative		
tests	evaluative	evaluative total	activity
me as I'd like to be	potency activity total	total	
studying	potency activity total	potency activity* total	evaluative potency activity total
academic honor society	activity total	total	potency

Note: all concepts not marked significant at .01 level of confidence
* significant at .05 level of confidence

The semantic differential scale concepts contributing most for the combined male and female groups were achievement, studying, and me as I'd like to be. For the total male group the concepts achievement and studying were not productive. For the total female group only three concepts contributed significantly and only the concept studying contributed on more than one factor; studying contributed on all factors. The concepts failure, me as I am, reading, and college graduate did not contribute sufficiently to enter the regression equations for any factors at a significant level.

Male vs. female with respect to semantic differential responses

Standard errors with respect to multiple correlation (SE_R) were computed for the total male and total female groups for each factor and factor summation scores. The SE_R's were extended to the .05 level of confidence by multiplying by 1.96. The extended standard error was then added and subtracted from its parent R. In every instance the extended R for males overlapped with the corresponding R for females. The data does not indicate that a difference between male and female responses exists at the .05 level of confidence. The data for this section is found in Table 12.

This finding is in opposition to the findings of many studies using the semantic differential which were reviewed. It is also in opposition to the findings of most studies of motivation as applied to grade prediction. On the basis of the earlier findings the decision to group the subjects by six was made. However, the opportunity to compare the results herein with those of earlier studies concerning the six groupings could not be ignored. The findings were not anticipated.

General comments

The polar pairs used in the study were not individually analyzed following collection of data. However, during scoring supposed discrepancies were noted in the manner in which certain students responded to certain polar pairs. These polar pairs were answered in a manner almost in opposition to other polar pairs related to the same factor. This could have been the response which should have been provided by the subject; however a misinterpretation as to which adjective of the polar pair was most desirable might also have occurred. If the instance is correct, then lowered predictive validity was the result. Without a detailed analysis this supposition remains a supposition.

The total number of students used in this study was more than adequate, but the number which was available on the specified ACT levels was disappointingly small. The final R for several of these small groups was exceedingly high--as high as 1.000--and grades predicted by the total regression equation were in one instance correct to .001 of a grade point. With the number of variables and the small number of students, this relationship seemed to be curve fitting. The significance level of the results of the administration of the semantic differential scale to these groups was sufficiently high to justify the rejection of the null hypothesis, but further study using a revised scale and much larger groups must be accomplished if practical use is to be made of the semantic differential technique for grade prediction purposes.

Certain concepts which entered prominently in several of the regression equations when academic ability was held constant did not

TABLE 12

SE_R COMPARING MALE AND FEMALE GROUPS, ACT AND SEMANTIC DIFFERENTIAL SCORES COMBINED

Group	N	R^1	SE_R	Extended R $R + SE_R$ (1.96)	Relationship
Evaluative					
Male	524	0.530	0.315	0.468--0.591	
Female	420	0.608	0.030	0.548--0.668	related
Potency					
Male	524	0.508	0.032	0.445--0.572	
Female	420	0.613	0.031	0.553--0.673	related
Activity					
Male	524	0.520	0.032	0.457--0.582	
Female	420	0.616	0.032	0.557--0.675	related
Summation score					
Male	524	0.532	0.032	0.469--0.595	
Female	420	0.612	0.027	0.559--9.665	related

[1] taken from cut-off point of multiple regression equation

play a prominent part when the ACT score was added as another variable. The small number of students in the first groups may have been responsible for this occurrence. Another explanation is that certain of the concepts which were prominent in the smaller groups in which the academic ability was held constant may also be highly related to the ACT score so that when the ACT score is added as a variable these concepts loose their discriminating power. The relationships of the various concepts by group and by factor are presented in the correlation matrices in Appendices B and C.

Although the method of analysis yields results which cause the null hypothesis to be rejected, the absence of an emerging pattern of concepts which discriminates at the various ACT levels is disturbing. This may be attributed to the varying effect of differential ability, or it might be attributed to the method of analysis employed--the step-wise regression technique.

The next chapter will present a summary of the study and will make recommendations for further investigation.

CHAPTER 4

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of the study was to determine if a semantic differential scale designed to yield a measure of academic motivation could (1) predict the extent to which students of equal academic ability will differ in achievement, and (2) combine with known academic aptitude factors to provide better prediction than afforded by either by itself.

The subjects were 944 freshmen of Northeastern State College during the fall semester 1967. Students having ACT scores of 12, 17, and 22 were used to investigate the first question. In addition to academic aptitude, students were grouped according to their sex; the semantic differential technique yielded four factors, which when combined with the academic and sex stratifications provided twenty-four groups. Multiple correlations between grades and semantic differential scale scores which were significant at or above the .05 level of confidence were found for each group of subjects. The semantic differential scale as devised for this study can predict the extent to which students of equal ability will differ in achievement.

The ACT score and the semantic differential scale scores were combined in regression equations for the males, females, and combined males and females of the subject population. In each instance a multiple correlation was found which was significantly higher than provided by the academic factor by itself. Indications from the data lead to the belief that the academic factor is a better predictor than the semantic differential scale, but that the combination is better than either separately.

The reliability of the semantic differential scale was checked by a test-retest technique involving a time lapse of one week between administrations and three randomly selected orientation classes. A product-moment correlation coefficient was computed for each of the four sets of data for each of the subject stratifications. A "t" test was used to determine the significance of the correlations; each correlation was significant at or above the .001 level of confidence.

The question of male-female differential responses to the semantic differential scale was investigated by use of the standard error of a multiple correlation (SE_R). The SE_R's were computed for each R and then were extended to the .05 level of confidence by multiplying by 1.96. This value was then added and subtracted from the appropriate R. The extended R's from the male-female pairs were compared; if there was an overlap in value the pairs cannot be said to have originated from different or dissimilar populations. All pairs overlapped, therefore no significant difference (.05 level of confidence) between male and female responses was found.

Conclusions

Two general approaches to the use of the semantic differential scale for use in grade prediction were identified. One was to combine semantic differential scale scores derived from motivation concepts with academic aptitude scores into a general multiple regression equation. The other approach was to hold the academic aptitude constant and apply the semantic differential scale scores to students of equal ability. In this approach a separate multiple regression equation is necessary for each academic aptitude level. No information is available as to which of these approaches is more sensitive in predicting students' grades, but both will seemingly work. The first method seems more applicable when assessing the abilities of a large number of students of all ability levels. The latter might be more useful when assessing students of borderline ability to ascertain which students of this academic level would be more able to achieve satisfactory college grades.

Recommendations

Many questions remain unanswered. Further investigation of academic motivation should lead to the identification of new concepts which by replacing non-productive concepts, would add to the prediction value of the scale. Polar pairs should be sought which are specifically related to the concept for which they are used rather than being general for all concepts; scoring procedures which would account for use of different polar pairs should be investigated.

Different statistical models from which the regression equations can be derived should be investigated; and, a comparison of general multiple regression equations with multiple regression equations designed for specific academic aptitude should allow determination of which is the most sensitive predictor at various levels of academic ability.

The semantic differential technique as applied to achievement motivation concepts shows much promise but the task of devising a practical scale for extensive use has only just begun.

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APPENDIX A

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APPENDIX A

INSTRUCTIONS:

The purpose of this study is to measure the meanings of certain things to various people by having them judge them against a series of descriptive scales. In taking this test, please make your judgments on the basis of what these things mean to you. On each page of this booklet you will find two different concepts to be judged and beneath it a set of scales. You are to rate the concept on each of these scales in order.

Here is how you are to use these scales: If you feel that the concept at the top of the page is very closely related to one end of the scale, you should place your check-mark as follows:

fair__X__:_____:_____:_____:_____:_____:_____unfair

OR

fair_____:_____:_____:_____:_____:_____:__X__unfair

If you feel that the concept is quite closely related to one or the other end of the scale (but not extremely), you should place your check-mark as follows:

strong_____:__X__:_____:_____:_____:_____:_____:weak

OR

strong_____:_____:_____:_____:_____:__X__:_____:weak

If the concept seems only slightly related to one side as opposed to the other side (but is not really neutral), then you should check as follows:

active_____:_____:__X__:_____:_____:_____:_____:passive

OR

active_____:_____:_____:_____:__X__:_____:_____:passive

The direction toward which you check, of course, depends upon which of the two ends of the scale seem most characteristic of the thing you're judging.

If you consider the concept to be neutral on the scale, both sides of the scale equally associated with the concept, or if the scale is completely irrelevant, unrelated to the concept, then you should place your check-mark in the middle space:

safe_____:_____:_____:__X__:_____:_____:_____:dangerous

IMPORTANT: (1) Place your check-marks in the middle of spaces, not on the boundaries:

THIS NOT THIS

_____:_____:__X__:_____:_____X_____:_____:

(2) Be sure you check every scale for every concept.
Do not omit any.

(3) Never put more than one check-mark on a single scale.

Sometimes you may feel as though you've had the same item before on the test. This will not be the case, so do not look back and forth through the items. Do not try to remember how you checked similar items earlier in the test. Make each item a separate and independent judgment. Work at fairly high speed through this test. Do not worry or puzzle over individual items. It is your first impressions, the immediate "feelings" about the items, that we want. On the other hand, please do not be careless, because we want your true impressions.

ACADEMIC HONOR SOCIETY

awful_______:_______:_______:_______:_______:_______:_______nice

large_______:_______:_______:_______:_______:_______:_______small

dull_______:_______:_______:_______:_______:_______:_______sharp

passive_______:_______:_______:_______:_______:_______:_______active

heavy_______:_______:_______:_______:_______:_______:_______light

beautiful_______:_______:_______:_______:_______:_______:_______ugly

strong_______:_______:_______:_______:_______:_______:_______weak

slow_______:_______:_______:_______:_______:_______:_______fast

bad_______:_______:_______:_______:_______:_______:_______good

FUTURE

beautiful_______:_______:_______:_______:_______:_______:_______ugly

slow_______:_______:_______:_______:_______:_______:_______fast

heavy_______:_______:_______:_______:_______:_______:_______light

active_______:_______:_______:_______:_______:_______:_______passive

large_______:_______:_______:_______:_______:_______:_______small

nice_______:_______:_______:_______:_______:_______:_______awful

strong_______:_______:_______:_______:_______:_______:_______weak

bad_______:_______:_______:_______:_______:_______:_______good

dull_______:_______:_______:_______:_______:_______:_______sharp

ME AS I WOULD LIKE TO BE

weak______:______:______:______:______:______:______strong

large______:______:______:______:______:______:______small

dull______:______:______:______:______:______:______sharp

active______:______:______:______:______:______:______passive

light______:______:______:______:______:______:______heavy

beautiful______:______:______:______:______:______:______ugly

fast______:______:______:______:______:______:______slow

bad______:______:______:______:______:______:______good

awful______:______:______:______:______:______:______nice

ACHIEVEMENT

active______:______:______:______:______:______:______passive

fast______:______:______:______:______:______:______slow

ugly______:______:______:______:______:______:______beautiful

awful______:______:______:______:______:______:______nice

good______:______:______:______:______:______:______bad

heavy______:______:______:______:______:______:______light

dull______:______:______:______:______:______:______sharp

weak______:______:______:______:______:______:______strong

large______:______:______:______:______:______:______small

ME AS I AM

ugly_______:_______:_______:_______:_______:_______:_______beautiful

good_______:_______:_______:_______:_______:_______:_______bad

active_______:_______:_______:_______:_______:_______:_______passive

large_______:_______:_______:_______:_______:_______:_______small

weak_______:_______:_______:_______:_______:_______:_______strong

nice_______:_______:_______:_______:_______:_______:_______awful

dull_______:_______:_______:_______:_______:_______:_______sharp

light_______:_______:_______:_______:_______:_______:_______heavy

slow_______:_______:_______:_______:_______:_______:_______fast

TESTS

fast_______:_______:_______:_______:_______:_______:_______slow

sharp_______:_______:_______:_______:_______:_______:_______dull

large_______:_______:_______:_______:_______:_______:_______small

heavy_______:_______:_______:_______:_______:_______:_______light

awful_______:_______:_______:_______:_______:_______:_______nice

bad_______:_______:_______:_______:_______:_______:_______good

active_______:_______:_______:_______:_______:_______:_______passive

ugly_______:_______:_______:_______:_______:_______:_______beautiful

weak_______:_______:_______:_______:_______:_______:_______strong

FAILURE

heavy_______:_______:_______:_______:_______:_______:_______light

bad_______:_______:_______:_______:_______:_______:_______good

strong_______:_______:_______:_______:_______:_______:_______weak

large_______:_______:_______:_______:_______:_______:_______small

ugly_______:_______:_______:_______:_______:_______:_______beautiful

dull_______:_______:_______:_______:_______:_______:_______sharp

fast_______:_______:_______:_______:_______:_______:_______show

passive_______:_______:_______:_______:_______:_______:_______active

awful_______:_______:_______:_______:_______:_______:_______nice

CHEATING

sharp_______:_______:_______:_______:_______:_______:_______dull

large_______:_______:_______:_______:_______:_______:_______small

awful_______:_______:_______:_______:_______:_______:_______nice

strong_______:_______:_______:_______:_______:_______:_______weak

good_______:_______:_______:_______:_______:_______:_______bad

heavy_______:_______:_______:_______:_______:_______:_______light

passive_______:_______:_______:_______:_______:_______:_______active

slow_______:_______:_______:_______:_______:_______:_______fast

ugly_______:_______:_______:_______:_______:_______:_______beautiful

STUDYING

passive______:______:______:______:______:______:______active

strong______:______:______:______:______:______:______weak

good______:______:______:______:______:______:______bad

heavy______:______:______:______:______:______:______light

fast______:______:______:______:______:______:______slow

dull______:______:______:______:______:______:______sharp

nice______:______:______:______:______:______:______awful

ugly______:______:______:______:______:______:______beautiful

large______:______:______:______:______:______:______small

COLLEGE GRADUATE

good______:______:______:______:______:______:______bad

dull______:______:______:______:______:______:______sharp

small______:______:______:______:______:______:______large

passive______:______:______:______:______:______:______active

strong______:______:______:______:______:______:______weak

nice______:______:______:______:______:______:______awful

slow______:______:______:______:______:______:______fast

beautiful______:______:______:______:______:______:______ugly

heavy______:______:______:______:______:______:______light

QUITTING SCHOOL

small______:______:______:______:______:______:______large

beautiful______:______:______:______:______:______:______ugly

sharp______:______:______:______:______:______:______dull

slow______:______:______:______:______:______:______fast

strong______:______:______:______:______:______:______weak

heavy______:______:______:______:______:______:______light

bad______:______:______:______:______:______:______good

passive______:______:______:______:______:______:______active

nice______:______:______:______:______:______:______awful

READING

nice______:______:______:______:______:______:______awful

good______:______:______:______:______:______:______bad

small______:______:______:______:______:______:______large

sharp______:______:______:______:______:______:______dull

active______:______:______:______:______:______:______passive

ugly______:______:______:______:______:______:______beautiful

fast______:______:______:______:______:______:______slow

heavy______:______:______:______:______:______:______light

weak______:______:______:______:______:______:______strong

APPENDIX B

VARIABLES IN CORRELATION MATRICES

List A for Matrices 73 to 96

1. Academic Honor Society
2. Future
3. Me As I Would Like to Be
4. Achievement
5. Me As I Am
6. Tests
7. Failure
8. Cheating
9. Studying
10. College Graduate
11. Quitting School
12. Reading

y Grade Point Average

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE EVALUATIVE FACTOR, ACT LEVEL 12, MALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.588	0.406	0.658	0.511	0.501	0.237	-0.041	0.586	0.685	-0.317	0.445	0.106
2		1.000	0.280	0.699	0.443	0.235	-0.067	-0.257	0.357	0.543	-0.302	0.352	0.148
3			1.000	0.473	0.488	0.070	-0.287	-0.312	0.009	0.361	-0.312	0.213	-0.003
4				1.000	0.408	0.369	-0.030	-0.245	0.274	0.714	-0.350	0.497	0.216
5					1.000	0.422	0.243	-0.088	0.320	0.391	-0.039	0.255	0.232
6						1.000	0.343	0.086	0.757	0.112	-0.172	0.571	0.533
7							1.000	0.739	0.413	-0.101	0.309	0.109	-0.020
8								1.000	0.165	-0.218	0.551	-0.134	-0.081
9									1.000	0.128	-0.238	0.616	0.110
10										1.000	-0.306	0.309	0.204
11											1.000	-0.343	-0.112
12												1.000	0.282

N = 23 GPA = 1.57

See page 75 for identification of the variables in the chart.

Multiple-regression equations

Step 1 $F = 8.3351^{**}$ $SEy = .581$ $MR = .533$ $Y = 533$ $Y = .6137 + .0797X_6$

Step 2 $F = 7.9096^{*}$ $SEy = .504$ $MR = .698$ $Y = 1.1609 + .1578X_6 - 0.1097X_9$

Step 3 $F = 1.2091$ $SEy = .501$ $MR = .719$ $Y = .5229 + .1569X_6 - .1125X_Q + .0385X_{10}$

**Significant above .01 level of confidence

*Significant above .05 level of confidence

A MR of .6979 has an F of 9.496 with 2, 20 df significant above .01 level of confidence

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE EVALUATIVE FACTOR, ACT LEVEL 12, FEMALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.191	-0.109	0.317	-0.086	0.177	-0.087	0.191	0.545	0.138	-0.469	0.549	0.132
2		1.000	0.044	0.379	0.031	-0.211	0.210	0.122	0.058	0.453	0.048	0.203	0.186
3			1.000	0.257	0.089	-0.348	-0.398	-0.314	0.154	0.569	-0.053	-0.227	-0.217
4				1.000	0.240	-0.010	-0.202	-0.002	0.625	0.262	-0.442	0.522	0.176
5					1.000	0.123	0.037	0.073	0.274	0.276	-0.066	0.171	-0.382
6						1.000	0.330	0.473	0.304	-0.391	0.060	0.194	0.011
7							1.000	0.384	-0.091	-0.062	0.213	0.063	0.138
8								1.000	0.036	-0.130	0.187	-0.120	-0.192
9									1.000	0.003	-0.529	0.760	0.178
10										1.000	0.014	-0.014	-0.320
11											1.000	-0.713	-0.138
12												1.000	0.381

N = 20   GPA = 1.7720

See page 75 for identification of the variables in the chart

Multiple-regression equations

Step 1 F = 3.0838 SEy = .6328 MRC = .38244 df = 1, 19 $Y = 3.32199 - .09538X_5$

Step 2 F = 5.3665 SEy = .5677 MRC = .59254 df = 1, 18 $Y = 2.76224 - .11494X_5 + .05590X_{12}$

*Significant at .05 level of confidence

An MRC of .59254 has an F of 4.5985* with df = 2, 17. Significant above .05 level of confidence

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE EVALUATIVE FACTOR, ACT LEVEL 17, MALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.444	0.040	0.449	0.372	0.448	-0.339	-0.423	-0.013	0.219	-0.225	0.205	0.041
2		1.000	-0.015	0.379	0.277	0.473	-0.038	-0.259	0.086	-0.062	-0.218	0.359	0.206
3			1.000	0.208	0.050	-0.160	-0.423	0.120	0.417	0.532	-0.529	-0.151	-0.279
4				1.000	0.360	0.277	-0.388	-0.430	0.272	0.370	-0.286	0.246	0.327
5					1.000	0.307	-0.070	0.200	0.286	-0.098	-0.036	0.271	0.131
6						1.000	-0.020	-0.370	0.075	-0.130	-0.017	.320	0.080
7							1.000	0.398	-0.402	-0.564	0.473	-0.093	-0.168
8								1.000	-0.081	-0.187	0.055	-0.095	-0.318
9									1.000	0.382	-0.333	0.430	0.145
10										1.000	-0.645	0.063	-0.080
11											1.000	-0.110	-0.166
12												1.000	0.148

N = 33 GPA - 1.7393

See page 75 for identification of the variables in the chart

Multiple-regression equations

Step 1 F = 3.7322 SEy = .7989 MRC = .32781 df = 1, 32 Y = .49300 + .07546

*Significant at .05 level of confidence

Step 2 F = 4.9148* SEy = .7528 MRC = .4828 df = 1, 31 $Y = 2.17965 - .10620X_3 + .09278X_4$

Step 3 F = 3.6423 SEy = .7216 MRC = .56451 df = 1, 30 $Y + 3.89390 = .1592X_3 + .07786X_4 - .09583X_{11}$

An MRC of .5645 has an F of 4.5211* with df = 3, 29. Significant above .05 level of confidence

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE EVALUATIVE FACTOR, ACT LEVEL 17, FEMALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	-0.189	0.154	0.316	0.540	0.221	-0.155	-0.349	0.535	0.438	-0.067	0.413	-0.071
2		1.000	0.116	-0.123	-0.112	0.207	0.072	-0.159	-0.305	0.110	0.014	-0.116	-0.017
3			1.000	0.400	0.395	-0.071	-0.346	-0.169	0.013	0.531	-0.406	0.125	0.156
4				1.000	0.332	-0.345	-0.380	-0.189	0.274	0.231	0.461	0.084	0.237
5					1.000	0.095	-0.043	-0.156	0.168	0.201	-0.288	0.160	0.041
6						1.000	0.236	-0.071	0.345	-0.166	0.264	0.311	-0.067
7							1.000	0.220	-0.208	-0.544	0.664	-0.008	-0.494
8								1.000	0.245	-0.259	-0.074	-0.169	-0.000
9									1.000	0.184	-0.257	0.479	0.126
10										1.000	0.493	0.173	0.134
11											1.000	0.034	-0.486
12												1.000	-0.081

N = 27 GPA = 2.5411

See page 75 for identification of the variables in the chart.

Multiple regression equations

Step 1 F = 8.0503** SEy = .0497 MRC = .49354 df = 1, 26 $Y = 2.967151 - .10466X_7$

Step 2 F = 1.5984 SEy = .4924 MRC = .53694 df = 1, 25 $Y = 3.09482 - .06487X_7 - .06458X_{11}$

An MRC of .53694 has an F of 4.86* with df = 2, 25. Significant above .05 level of confidence

**Significant at .01 level of confidence

*Significant at .05 level of confidence

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE EVALUATIVE FACTOR, ACT LEVEL 22, MALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.265	0.445	0.339	0.278	0.503	-0.257	-0.710	-0.051	0.638	-0.705	0.146	0.192
2		1.000	-0.009	0.063	-0.094	0.419	-0.335	-0.090	0.246	-0.210	0.003	0.320	0.273
3			1.000	0.555	-0.006	0.336	0.018	-0.247	0.070	0.624	-0.355	0.117	0.304
4				1.000	-0.179	0.392	-0.057	-0.243	-0.310	0.427	-0.497	0.298	0.276
5					1.000	0.006	-0.246	-0.107	0.310	0.214	-0.238	0.106	-0.291
6						1.000	-0.051	-0.468	-0.107	0.253	-0.237	0.544	0.355
7							1.000	0.203	-0.133	-0.140	0.165	-0.502	0.027
8								1.000	0.279	-0.583	0.749	-0.136	-0.177
9									1.000	-0.153	0.252	0.082	-0.030
10										1.000	-0.639	0.070	0.321
11											1.000	0.018	-0.130
12												1.000	0.223

N = 21 GPA = 2.3060

See page 75 for identification of the variables in the chart.

No multiple-regression equations show a significant value.

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE EVALUATIVE FACTOR, ACT LEVEL 22, FEMALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	-0.087	0.286	0.147	-0.151	0.181	-0.620	-0.013	0.254	0.713	0.058	0.127	-0.208
2		1.000	-0.061	0.471	0.479	0.133	0.324	0.096	0.407	-0.164	-0.642	0.737	0.074
3			1.000	-0.069	0.078	-0.055	-0.822	-0.141	-0.367	0.200	-0.227	-0.156	0.426
4				1.000	0.044	0.381	-0.002	0.044	0.636	-0.345	-0.411	0.177	-0.462
5					1.000	0.538	0.061	0.008	0.311	0.129	-0.580	0.560	0.330
6						1.000	-0.158	0.329	0.738	0.089	-0.232	0.335	-0.304
7							1.000	0.221	0.062	-0.323	0.078	0.192	-0.048
8								1.000	0.051	0.116	0.131	0.263	0.085
9									1.000	-0.108	-0.393	0.399	-0.540
10										1.000	0.232	0.233	0.190
11											1.000	-0.563	0.057
12												1.000	-0.109

N = 14   GPA = 2.82

See page 75 for identification of the variables in the chart.

Multiple regression equations

Step 1 F = 4.933* SEy = .373 MR = .540 df = 1, 18 $Y = 3.996 - .0767X_9$

Step 2 F = 6.957* SEy = .305 MR = .752 df = 1, 17 $Y = 3.015 + .0898X_5 - .1010X_9$

Step 3 F = .7033 SE y = .309 MR = .771 df = 1, 16 $Y \quad 3.013 + .1065X_5 - .0935X_9 - .0205X_{12}$

*significant at .05 level of confidence

An MR of .752 has an F value of 7.173 which is significant at the .01 level of confidence

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE POTENCY FACTOR, ACT LEVEL 12, MALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.360	0.046	-0.149	0.504	0.248	0.313	0.210	0.302	0.418	0.320	0.342	0.365
2		1.000	0.408	0.436	0.327	0.245	0.447	0.214	0.097	0.354	0.152	0.065	-0.214
3			1.000	0.573	0.517	0.381	0.129	-0.256	0.065	0.336	0.117	-0.145	-0.057
4				1.000	0.331	0.423	-0.177	-0.244	0.312	0.334	-0.192	0.286	0.128
5					1.000	0.244	0.052	0.074	0.278	0.183	0.055	0.136	0.088
6						1.000	-0.006	0.158	0.421	0.420	0.032	0.157	-0.037
7							1.000	0.449	0.161	-0.079	0.498	0.112	-0.121
8								1.000	-0.014	-0.065	0.508	-0.030	0.342
9									1.000	-0.000	0.259	0.442	-0.034
10										1.000	-0.013	0.227	-0.127
11											1.000	-0.069	-0.159
12												1.000	0.202

N = 23 GPA - 1.5736

See page 75 for identification of the variables in the chart.

Multiple-regression equations

Step 1 $F = 3.234$ $SEy = 0.639$ $MRC = 0.3653$ $df = 1,21$ $y = 2.4355 -0.06479X_1$

Step 2 $F = 5.368$* $SEy = 0.582$ $MRC = 0.563$* $df = 1,20$ $y = 2.1353 -0.0811X_1 + 0.0532X_8$

Step 3 $F = 5.751$* $SEy = .523$ $MRC = 0.690$* $df = 1,19$ $y = 1.7280 -0.1088X_1 + 0.0587X_8 + 0.056X_{12}$

Step 4 $F = 5.543$* SEy 0.470 $MRC = 0.774$* $df = 1,18$ $y = 1.1232 -0.1469X_1 + 0.0736X_5 + 0.0606X_8 + 0.0586X_{12}$

*Significant at .05 level of confidence
An MRC of .774 has an F value of 3.7358 which is significant at the .01 level of confidence

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE POTENCY FACTOR, ACT LEVEL 12, FEMALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.025	-0.207	0.441	0.440	0.030	-0.148	0.155	0.124	0.122	0.403	-0.116	-.437
2		1.000	0.403	0.551	0.120	0.313	0.123	-0.085	0.223	0.275	0.026	0.206	0.423
3			1.000	0.125	0.170	-0.322	0.216	-0.502	-0.046	-0.004	-0.518	0.005	-0.096
4				1.000	0.347	0.408	-0.120	0.140	0.487	0.214	-0.135	0.377	-0.093
5					1.000	0.118	0.254	-0.099	0.229	0.206	-0.019	0.035	-0.296
6						1.000	-0.122	0.396	0.458	0.396	0.119	0.464	0.293
7							1.000	-0.005	-0.361	0.025	0.440	-0.268	-0.154
8								1.000	0.066	-0.118	0.423	-0.231	0.035
9									1.000	0.334	-0.423	0.749	0.287
10										1.000	-0.050	0.367	0.077
11											1.000	-0.396	-0.243
12												1.000	0.328

N = 20 GPA = 1.77

See page 75 for identification of the variables in the chart

Multiple-regression equations

Step 1 F = 4.239 SEy = 0.616 MRC = .436 df = 1,18 $y = 2.3915 - 0.045X_1$

Step 2 F = 4.522* SEy = 0.564 MRC = .601 df = 1,17 $y = 1.2895 - 0.0437X_1 + 0.0663X_2$

Step 3 F = 5.050* SEy = 0.5064 MRC = 717 df = 1, 16 $y = 2.2379 - 0.0525X_1 + 0.9434X_2 - 0.1099X_3$

Step 4 F = 4.9717* SEy = 0.4533 MRC = .7969 df = 1,15 $y = 3.1253 - 0.0656X_1 + 0.1023X_2 - 0.1364X_3 - 0.0707X_{11}$

*Significant at .05 level of confidence

An MRC of .752 has an F value of 6.5239 which is significant at the .01 level of confidence

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE POTENCY FACTOR, ACT LEVEL 17, MALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.170	0.010	0.228	0.289	0.260	-0.256	-0.043	0.333	0.055	0.014	0.277	0.431
2		1.000	-0.200	0.056	0.463	0.207	-0.220	-0.110	-0.038	0.032	0.088	-0.187	0.314
3			1.000	0.414	0.268	0.065	-0.406	-0.379	0.107	0.614	-0.237	0.211	-0.162
4				1.000	0.079	0.336	-0.304	-0.431	0.118	0.655	-0.416	0.109	-0.010
5					1.000	0.191	-0.303	-0.057	-0.117	0.130	-0.057	0.355	0.305
6						1.000	-0.190	-0.317	0.145	0.211	-0.019	0.353	0.016
7							1.000	0.564	-0.330	-0.352	0.491	0.076	-0.148
8								1.000	-0.080	-0.422	0.599	0.039	0.199
9									1.000	0.153	0.057	-0.013	0.222
10										1.000	-0.479	0.134	0.052
11											1.000	0.127	0.068
12												1.000	0.073

N = 33   GPA = 1.7393

See page 75 for identification of the variables in the chart.

Multiple-regression equations

Step 1 F = 7.0725 SEy = 0.07630 MRC = .4310 df = 1, 32 Y = 0.53995 + 0.08914

Step 2 F = 2.3707 SEy = 0.7464 MRC = .49537

An MRC of .49537 has an F of 2.3707 with df = 2, 30. Significant above .05 level of confidence.

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE POTENCY FACTOR, ACT LEVEL 17, FEMALE

	1	2	3	4	5	6	7	8	9	10	11	12	v
1	1.000	0.062	0.300	0.096	-0.113	0.432	0.149	-0.083	0.198	-0.250	0.180	-0.205	0.182
2		1.000	0.019	-0.037	0.077	0.215	-0.011	-0.147	0.215	0.382	-0.132	0.161	0.137
3			1.000	0.443	0.340	0.020	-0.239	0.061	0.104	0.242	-0.091	0.105	0.380
4				1.000	-0.082	0.172	-0.244	0.166	0.234	0.362	-0.285	0.059	0.383
5					1.000	-0.199	09.163	0.041	0.183	-9.170	-0.300	0.507	0.187
6						1.000	0.095	0.013	0.195	-0.136	0.166	0.001	0.126
7							1.000	-0.007	0.150	-0.223	0.016	0.059	-0.330
8								1.000	0.019	-0.323	0.384	-0.191	0.283
9									1.000	0.131	-0.447	0.375	0.324
10										1.000	-0.423	0.160	-0.003
11											1.000	-0.331	-0.039
12												1.000	0.136

N = 27 GPA = 2.5411

See page 75 for identification of the variables in the chart

Multiple-regression equations

*Significant at .05 level of confidence

Step 1 F - 4.3100* SEy - .528 MRC = .3830 df = 1, 26 Y - 1.608 + $0.063X_4$

An MRC of .3830 has an F of 4.29* with df = 1,26. Significant above .05 level of confidence.

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE POTENCY FACTOR, ACT LEVEL 22, MALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.172	0.611	0.207	0.473	0.292	-0.436	-0.597	0.387	0.453	-0.517	0.139	0.278
2		1.000	0.394	0.156	-0.201	-0.174	-0.142	0.168	0.302	-0.149	-0.098	-0.056	-0.092
3			1.000	0.185	0.635	0.393	-0.376	-0.641	0.025	0.451	-0.516	0.074	0.229
4				1.000	-0.111	0.023	-0.110	-0.092	0.071	0.597	-0.305	0.227	0.379
5					1.000	0.427	-0.090	-0.373	-0.033	0.215	-0.269	0.142	-0.177
6						1.000	-0.202	-0.357	0.376	0.370	-0.067	0.672	0.193
7							1.000	0.656	-0.300	0.202	0.698	0.081	-0.212
8								1.000	-0.007	-0.481	0.680	-0.178	-0.137
9									1.000	0.136	0.091	0.194	0.250
10										1.000	-0.515	0.513	0.330
11											1.000	0.035	-0.243
12												1.000	0.328

N = 21 GPA = 2.3060

See page 75 for identification of
the variables in the chart

No significant regression equations
No significant multiple correlations

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE POTENCY FACTOR, ACT LEVEL 22 FEMALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.602	0.228	-0.032	-0.352	0.104	-0.234	-0.013	-0.082	0.060	-0.037	0.071	0.040
2		1.000	0.212	0.475	-0.390	-0.062	-0.165	-0.055	0.625	0.211	-0.178	0.435	0.018
3			1.000	-0.008	-0.317	0.178	-0.115	0.003	-0.023	-0.111	0.282	0.070	-0.594
4				1.000	-0.597	0.344	-0.404	-0.370	0.809	-0.029	-0.449	0.546	-0.133
5					1.000	-0.313	0.176	0.331	-0.278	0.293	0.467	-0.369	0.223
6						1 000	-0.268	-0.192	0.061	0.384	-0.346	0.458	-0.669
7							1.000	0.325	-0.354	0.195	0.237	-0.081	0.171
8								1.000	-0.365	0.019	0.697	-0.394	0.171
9									1.000	-0.365	-0.019	0.607	-0.095
10										1.000	0.208	-0.464	-0.103
11											1.000	-0.505	0.022
12												1.000	-0.244

N = 14 GPA = 2.8239

See page 75 for identification of the variables in the chart

Multiple-regression equations

Step 1 F = 9.7135** SEy = .3295 MRC = .66884 df = 1, 13 $Y = 3.84826 - .98912X_6$

Step 2 F = 8.0043* SEy = .2619 MRC = .82469 df = 1, 12 $Y = 4.79316 - .10132X_3 - .06968X_6$

An MRC of .82469 has an F of 11.6925** with df = 2, 11. Significant above .01 level of confidence.

*Significant at .05 level of confidence

**Significant at .01 level of confidence

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE ACTIVITY FACTOR, ACT LEVEL 12, MALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.453	-0.069	0.290	0.119	0.340	0.334	0.223	0.304	0.368	0.086	0.606	0.311
2		1.000	0.295	0.541	0.293	0.465	0.106	0.115	0.215	0.573	-0.042	0.162	0.018
3			1.000	0.354	0.540	0.293	-0.071	-0.152	0.184	0.139	-0.072	0.076	-0.055
4				1.000	0.267	0.503	-0.169	-0.141	0.275	0.661	-0.080	0.362	0.171
5					1.000	0.362	0.173	-0.154	0.213	0.235	0.134	0.221	-0.085
6						1.000	0.074	-0.091	0.566	0.154	0.196	0.298	0.005
7							1.000	0.542	0.361	0.115	0.519	0.098	-0.077
8								1.000	0.168	-0.095	0.668	-0.030	0.285
9									1.000	-0.016	0.149	0.399	0.058
10										1.000	-0.062	0.234	-0.138
11											1.000	-0.069	-0.030
12												1.000	0.339

N = 23   GPA = 1.5736

See page 75 for identification of the variables in the chart.

No significant regression equations

No significant multiple correlations

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE ACTIVITY FACTOR, ACT LEVEL 12, FEMALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.091	0.592	0.248	0.255	0.286	-0.397	0.112	0.366	0.030	-0.341	0.427	-0.004
2		1.000	0.551	-0.363	0.301	0.087	-0.221	0.304	0.000	-0.141	0.000	0.308	0.490
3			1.000	0.030	0.342	0.124	0.435	0.143	0.018	0.113	0.192	0.204	0.230
4				1.000	0.294	0.105	-0.109	-0.090	0.315	0.269	-0.192	0.204	
5					1.000	0.612	0.153	0.340	0.364	0.525	-0.439	0.385	0.185
6						1.000	0.335	0.294	0.607	0.173	-0.324	0.486	0.181
7							1.000	0.347	0.126	-0.110	0.203	-0.181	0.087
8								1.000	0.484	0.110	-0.061	0.100	0.341
9									1.000	0.147	-0.452	0.482	0.238
10										1.000	-0.370	0.309	-0.150
11											1.000	-0.601	0.178
12												1.000	0.309

N = 20 GPA = 1.7720

See page 75 for identification of the variables in the chart.

Multiple-regression equations

Step 1 $F = 5.699$* $SEy = 0.597$ $MRC = 0.4904$ $df = 1,18$ $y = 0.2193 + 0967X_2$

An MRC of 0.4904 has an F value of 3.0077 which is not significant at the .05 level of confidence

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE ACTIVITY FACTOR, ACT LEVEL 17, MALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.373	0.251	0.593	0.391	-0.046	-0.184	-0.020	0.132	0.187	-0.306	0.264	0.231
2		1.000	0.113	0.335	0.463	0.307	-0.122	-0.066	0.175	0.062	-0.263	0.250	0.193
3			1.000	0.382	0.089	-0.400	-0.329	-0.267	-0.084	0.456	-0.613	-0.156	-0.145
4				1.000	0.335	-0.028	-0.426	-0.423	0.271	0.519	-0.503	0.206	0.132
5					1.000	0.281	-0.005	-0.113	0.385	0.292	-0.353	0.220	0.333
6						1.000	-0.071	0.172	0.476	-0.106	0.336	0.409	0.103
7							1.000	0.582	-0.186	-0.351	0.121	0.192	-0.193
8								1.000	-0.043	-0.337	0.358	0.281	0.084
9									1.000	0.324	0.103	0.195	0.301
10										1.000	-0.603	0.023	0.007
11											1.000	-0.122	-0.119
12												1.000	0.056

N = 22 GPA = 1.7393

See page 75 for identification of the variables in the chart

No significant regression equations
No significant multiple correlations

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE ACTIVITY FACTOR, ACT LEVEL 17, FEMALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	-0.051	0.358	0.079	0.276	0.098	-0.113	0.037	0.064	0.284	0.049	0.024	0.266
2		1.000	0.124	-0.156	-0.166	0.403	-0.139	-0.307	0.043	0.225	-0.442	-0.223	0.126
3			1.000	0.242	0.358	0.126	-0.216	-0.227	-0.355	0.228	-0.006	-0.150	0.088
4				1.000	0.548	-0.079	0.050	-0.106	0.073	0.103	-0.130	-0.011	0.179
5					1.000	-0.236	0.011	-0.069	-0.155	-0.020	0.130	-0.006	0.007
6						1.000	0.406	-0.300	0.228	0.045	-0.182	0.316	-0.121
7							1.000	0.224	-0.043	-0.307	0.423	0.301	-0.336
8								1.000	-0.006	-0.180	0.173	-0.188	0.108
9									1.000	0.172	-0.361	0.318	-0.054
10										1.000	-0.394	-0.144	-0.033
11											1.000	-0.310	-0.312
12												1.000	-0.278

N = 27   GPA = 2.5411

See Page 75 for identification of
the variables in the chart.

No significant regression equations.
No significant multiple correlations.

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE ACTIVITY FACTOR, ACT LEVEL 22, MALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	-0.063	0.586	0.207	0.330	0.309	-0.299	-0.704	0.339	0.626	-0.306	0.165	0.341
2		1.000	-0.129	-0.051	0.325	-0.282	-0.254	0.302	0.033	-0.198	-0.452	-0.173	-0.291
3			1.000	0.443	0.585	0.326	0.199	-0.534	-0.077	0.673	-0.259	-0.216	0.063
4				1.000	0.188	0.393	-0.020	-0.181	-0.041	0.429	-0.350	-0.096	0.211
5					1.000	0.014	0.053	-0.200	0.067	0.258	-0.269	-0.218	-0.244
6						1.000	-0.101	-0.490	0.323	0.400	-0.479	0.423	0.241
7							1.000	0.379	-0.302	-0.135	0.513	-0.463	-0.176
8								1.000	-0.258	-0.573	0.397	-0.312	-0.251
9									1.000	-0.043	-0.144	0.495	0.190
10										1.000	-0.474	0.105	0.351
11											1.000	-0.323	0.045
12												1.000	0.278

N = 21 GPA = 2.3060

See page 75 for identification of the variables in the chart.

No significant regression equations.
No significant multiple correlations.

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR THE ACTIVITY FACTOR, ACT LEVEL 22, FEMALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	-0.020	-0.202	-0.175	-0.151	0.305	-0.295	0.397	0.004	0.399	0.204	0.402	0.019
2		1.000	0.106	0.746	0.788	0.572	-0.182	-0.107	0.813	0.004	-0.017	0.399	-0.138
3			1.000	-0.025	0.241	0.309	-0.104	0.121	0.099	0.344	-0.383	-0.178	-0.309
4				1.000	0.667	0.590	-0.312	-0.243	0.696	-0.311	-0.028	0.314	0.128
5					1.000	0.583	-0.112	0.057	0.835	0.068	-0.067	0.374	-0.154
6						1.000	-0.422	-0.033	0.673	0.206	-0.186	0.419	-0.158
7							1.000	0.243	-0.334	-0.185	0.021	-0.273	-0.076
8								1.000	-0.161	0.408	0.516	0.059	0.009
9									1.000	-0.012	0.104	0.705	-0.214
10										1.000	-0.170	0.273	0.034
11											1.000	0.388	-0.026
12												1.000	-0.182

N = 14   GPA = 2.8239

See page 75 for identification of the variables in the chart.

No significant regression equations.
No significant multiple correlations.

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR FACTOR SUMMATION SCORES
ACT LEVEL 12, MALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.264	-0.000	0.077	0.240	0.167	0.429	0.268	0.190	0.277	0.077	0.423	0.136
2		1.000	0.415	0.696	0.432	0.469	0.129	-0.040	0.277	0.503	-0.123	0.268	0.004
3			1.000	0.473	0.645	0.301	-0.112	-0.245	0.084	0.172	-0.163	0.027	-0.051
4				1.000	0.365	0.552	-0.178	-0.212	0.267	0.568	-0.230	0.463	0.192
5					1.000	0.523	0.216	-0.037	0.293	0.258	-0.037	0.308	0.098
6						1.000	0.183	0.069	0.716	0.169	0.051	0.556	0.230
7							1.000	0.656	0.384	0.054	0.551	0.017	-0.084
8								1.000	0.163	-0.063	0.690	-0.036	0.225
9									1.000	-0.003	0.041	0.579	0.028
10										1.000	-0.070	0.257	-0.078
11											1.000	-0.155	-0.110
12												1.000	0.271

N = 23 GPA = 1.5736

See page 75 for identification of the variables in the chart.

No significant variables.
No significant multiple-regression equations.

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR SUMMATION FACTOR SCORES
ACT LEVEL 12, FEMALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.028	0.067	0.333	0.119	-0.224	-0.548	0.059	0.149	0.164	-0.415	0.169	-0.290
2		1.000	0.532	0.343	0.159	0.057	-0.096	-0.150	0.145	0.246	-0.135	0.266	0.486
3			1.000	0.191	0.066	-0.016	-0.243	-0.283	-0.068	0.254	-0.184	0.086	0.000
4				1.000	0.466	0.148	-0.365	-0.126	0.577	0.380	-0.597	0.522	0.078
5					1.000	0.428	0.011	0.003	0.412	0.653	-0.265	0.416	-0.242
6						1.000	0.418	0.214	0.246	0.043	-0.118	0.426	0.162
7							1.000	0.241	-0.249	-0.186	0.395	-0.178	0.045
8								1.000	0.179	0.013	0.166	-0.220	0.150
9									1.000	0.300	-0.594	0.700	0.245
10										1.000	-0.137	0.267	-0.125
11											1.000	-0.723	-0.164
12												1.000	0.372

N = 20 GPA = 1.7720

See page 75 for identification of the variables in the chart

Multiple-regression equations

Step 1 F=5.5608* SEy=.5986 MR=.48582 df=1, 19 $Y=00.06646+.03677X_2$

Step 2 F=2.6850 SEy=.5725 MR=.583 df=1, 18 $Y=1.16640+.04069X_2-0.03343X_5$

Step 3 F=5.5083* SEy = .5089 MR=.714 df =1, 17 $Y=1.46982+03349X_2-.05158X_5+.01994X_{12}$

Step 4 F=4.4775 SEy=.4613 MR=.789 df=1, 16 $Y=.78131+.03652X_2-.05588X_5+.02471X_8+.02357X_{12}$

Step 5 F=7.2205* SEy=.3878 MR=.866 df=1, 15 $Y=1.18652-.01490X_1+.03625X_2-.05404X_5+.02718X_8+.02628X_{12}$

A MR of .866 with 5, 15 df has an F value of 8.437 which is significant above the .01 level of confidence.

*Significant at .05 level of confidence.

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR FACTOR SUMMATION SCORES
ACT LEVEL 17, MALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.251	0.116	0.512	0.458	0.390	-0.342	-0.259	0.236	0.152	-0.224	0.341	0.304
2		1.000	0.091	0.141	0.364	0.351	0.019	0.159	0.028	0.000	0.244	0.178	0.061
3			1.000	0.388	0.058	-0.299	-0.513	-0.261	0.075	0.635	-0.544	-0.072	-0.160
4				1.000	0.270	0.267	-0.486	-0.388	0.186	0.562	0.414	0.236	0.161
5					1.000	0.412	-0.215	-0.200	0.196	0.109	-0.213	0.325	0.312
6						1.000	-0.176	-0.321	0.318	-0.086	0.118	0.447	0.092
7							1.000	0.677	-0.319	-0.574	0.418	0.055	-0.209
8								1.000	-0.150	-0.408	0.376	0.082	-0.015
9									1.000	0.189	0.045	0.197	0.290
10										1.000	-0.655	0.095	-0.002
11											1.000	-0.008	-0.070
12												1.000	0.101

N + 33   GPA = 1.7393

See page 75 for identification of the variables in the chart.

Non-significant variables

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR FACTOR SUMMATION SCORES, ACT LEVEL 17, FEMALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.047	0.087	0.089	-0.137	0.250	-0.214	0.031	0.194	0.254	0.159	0.198	0.194
2		1.000	0.055	-0.171	-0.267	0.327	0.076	-0.281	0.156	0.209	-0.328	0.024	0.172
3			1.000	0.495	0.333	0.038	-0.426	-0.071	-0.017	0.322	-0.196	-0.056	0.391
4				1.000	0.307	-0.124	-0.331	0.115	0.170	0.360	-0.350	-0.023	0.321
5					1.000	-0.055	-0.086	0.096	-0.062	-0.051	0.000	0.076	0.610
6						1.000	0.412	-0.156	0.434	-0.114	0.055	0.504	-0.045
7							1.000	0.292	-0.025	-0.539	0.497	0.134	-0.490
8								1.000	0.103	-0.216	0.181	0.154	0.271
9									1.000	0.111	-0.437	0.379	0.173
10										1.000	-0.051	-0.043	0.113
11											1.000	0.121	-0.282
12												1.000	-0.105

N = 27 GPA = 2.5411

See page 75 for identification of the variables in the chart

Step 1 F=7.8916** SEy=0.4898 MRC=48982 df=1, 25 $Y=3.31477-0.03499X_7$

Step 2 F=7.8167^{x} SEy=0.4420 MRC=.65319 df=1, 24 $Y=2.91674-0.0444X_7+.03147X_8$

Step 3 F=6.9938* SEy=0.3954 MRC=0.74856 df=1, 23 $Y=1.3412+0.02957X_2-0.0492X_7+0.0404X_8$

Step 4 F=4.1950 SEy=0.3954 MRC=0.79420 df=1, 22 $Y=2.8101+0.036X_2-.0625X_7+0.0409X_8-0.0284X_{10}$

Step 5 F=5.1625* SEy=0.3397 MRC=0.8388 df=1, 21 $Y=2.45324+0.0309X_2+0.0235X_6-0.0743X_7+0.0461X_8-0.0302X_{10}$

An R of 0.839 has an F of value 9.970 with df=5, 21 which is significant above the .01 level of confidence

**Significant at the .01 level of confidence

*Significant at the .05 level of confidence

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR FACTOR SUMMATION SCALES
ACT LEVEL 22, MALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.151	0.708	0.358	0.449	0.481	-0.429	-0.739	0.203	0.660	-0.684	0.189	0.300
2		1.000	-0.313	-0.071	0.078	-0.012	-0.320	0.181	0.327	-0.203	-0.173	0.109	-0.003
3			1.000	0.502	0.506	0.423	-0.079	-0.633	-0.113	0.662	-0.566	0.003	0.224
4				1.000	0.036	0.209	-0.075	-0.182	0.084	-0.646	-0.384	0.126	0.345
5					1.000	0.316	-0.112	-0.416	0.159	0.252	-0.396	-0.025	-0.270
6						1.000	-0.282	-0.534	0.205	0.414	-0.298	0.640	0.335
7							1.000	0.548	-0.285	-0.318	0.561	-0.292	-0.215
8								1.000	0.024	-0.637	0.727	-0.236	-0.199
9									1.000	-0.016	0.077	0.274	0.154
10										1.000	-0.710	0.264	0.353
11											1.000	-0.017	-0.165
12												1.000	0.303

N = 21   GPA = 2.3060

See page 75 for identification of the variables in the chart.

No significant variables.

CORRELATIONS BETWEEN CONCEPTS AND CONCEPTS AND CRITERION SCORES FOR FACTOR SUMMATION SCORES
ACT LEVEL 22, FEMALE

	1	2	3	4	5	6	7	8	9	10	11	12	y
1	1.000	0.098	0.146	-0.031	0.051	0.306	-0.634	0.365	0.121	0.774	0.112	0.283	-0.065
2		1.000	-0.086	0.886	0.610	0.305	-0.251	-0.151	0.849	-0.057	-0.434	0.602	-0.014
3			1.000	-0.032	-0.126	0.217	-0.321	0.441	-0.139	0.090	-0.002	-0.130	-0.027
4				1.000	0.573	0.503	-0.202	-0.141	0.856	-0.177	-0.435	0.524	-0.172
5					1.000	0.402	-0.140	0.101	-0.637	0.243	-0.449	0.345	0.216
6						1.000	-0.309	0.062	0.630	0.344	-0.433	0.488	-0.451
7							1.000	0.141	-0.324	-0.409	0.411	-0.289	0.030
8								1.000	-0.264	0.307	0.629	-0.137	0.099
9									1.000	0.080	-0.600	0.800	-0.257
10										1.000	0.021	0.291	0.041
11											1.000	-0.391	-0.025
12												1.000	-0.190

N = 14   GPA = 2.8239

See page 75 for identification of the variables in the chart.

No significant variables.

APPENDIX C

VARIABLES IN CORRELATION MATRICES

List B for Matrices 98 to 109

1. *ACT* Score
2. Academic Honor Society
3. Future
4. Me As I Would Like to Be
5. Achievement
6. Me As I Am
7. Tests
8. Failure
9. Cheating
10. Studying
11. College Graduate
12. Quitting School
13. Reading

y Grade Point Average

EVALUATIVE FACTOR COMBINED WITH ACT SCORES FOR 524 MALE SUBJECTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	y
1	1.000	-0.045	0.010	-0.093	0.016	-0.132	0.037	-0.250	-0.033	0.070	-0.045	0.016	0.137	0.493
2		1.000	0.236	0.251	0.243	0.232	0.235	-0.077	-0.210	0.221	0.247	-0.184	0.161	0.039
3			1.000	0.178	0.282	0.239	0.142	-0.077	-0.114	0.167	0.170	-0.134	0.067	0.111
4				1.000	0.321	0.346	-0.011	0.201	-0.237	-0.157	0.427	-0.311	0.148	-0.068
5					1.000	0.249	0.099	0.183	-0.238	0.198	0.296	-0.241	0.218	0.124
6						1.000	0.217	0.034	-0.116	0.189	0.125	-0.119	0.101	-0.456
7							1.000	0.182	-0.089	0.322	0.006	-0.035	0.205	0.182
8								1.000	0.355	-0.131	-0.246	0.262	0.139	-0.136
9									1.000	-0.203	-2.281	0.381	-0.162	-0.079
10										1.000	0.175	-0.172	0.292	0.105
11											1.000	-0.428	0.172	-0.010
12												1.000	-0.180	-0.743
13													1.000	0.103

N = 524   GPA = 2.0500

See page 97 for identification of variables in the chart.

Multiple regression equations

Step 1 F = 167.929** SEy = .634 MR = .49336** df = 1,522
$y = .7466 + .744X_1$

Step 2 F = 19.153** SEy = .623 MR = .5198** df = 2,521 $y = .3954 + .0735X_1 + .030X_7$

Step 3 F = 7.318** SEy = .620 MR = .5295** $y = -0.0023 + 0.0733X_1 + 0.0243X_5 + 0.0288X_7$

An MR of .5295 with 3,520 df has an F value of 67.53 which is significant above the .01 level of confidence

**Significant above .01 level of confidence.

POTENCY FACTOR COMBINED WITH ACT SCORES FOR 524 MALE SUBJECTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	y
1	1.000	-0.093	-0.052	-0.078	-0.037	-0.111	0.136	0.083	0.091	0.119	-0.106	0.083	0.203	0.493
2		1.000	0.190	0.159	0.197	0.204	0.238	-0.063	-0.047	0.164	0.130	-0.039	0.107	0.023
3			1.000	0.216	0.299	0.178	0.217	-0.051	-0.031	0.210	0.229	-0.177	0.105	-0.023
4				1.000	0.215	0.236	0.167	-0.158	-0.097	- .084	0.260	-0.122	0.047	-0.068
5					1.000	0.202	0.203	-0.123	-0.129	0.287	0.301	-0.200	0.264	0.081
6						1.000	0.153	-0.098	-0.022	0.033	0.140	-0.071	0.144	-0.038
7							1.000	-0.039	-0.063	0.365	0.178	-9.119	0.284	0.137
8								1.000	0.330	-0.140	-0.192	0.331	-0.019	-0.008
9									1.000	-0.075	-0.223	0.417	-0.053	0.049
10										1.000	0.223	-0.112	0.305	0.180
11											1.000	-0.357	0.246	-0.001
12												1.000	-0.068	0.004
13													1.000	0.124

N = 524   GPA = 2.0500

See page 100 for identification of variables in the chart

Step 1 F = 167.929** SEy = .634 MR = .4934** df = (1, 522)
Y = .74661 + .07442

Step 2 F = 10.406** SEy = .629 MR = .5082** df = (2,521) Y = .4807 + .0722X_1
.0218X_{10}

An MR of .5032 with 2, 521 df has an F value of 62.2337 which is significant above .01 level of confidence.

** Significant above .01 level of confidence.

ACTIVITY FACTOR COMBINED WITH ACT SCORES FOR 524 MALE SUBJECTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	y
1	1.000	-0.065	0.071	-0.068	-0.005	-0.020	0.199	-0.119	0.055	0.074	0.048	-0.004	0.230	0.493
2		1.000	0.232	0.276	0.250	0.206	0.229	-0.079	-0.077	0.261	0.250	-0.167	0.241	0.082
3			1.000	0.209	0.377	0.425	0.262	-0.205	-0.126	0.245	0.253	-0.206	0.238	0.082
4				1.000	0.309	0.309	0.106	-0.153	-0.142	0.113	0.352	-0.251	0.072	-0.032
5					1.000	0.366	0.250	-0.163	-0.186	0.292	0.294	-0.250	0.252	0.137
6						1.000	0.226	-0.040	-0.085	0.210	0.230	-0.163	0.180	0.049
7							1.000	-0.082	-0.086	0.396	0.155	-0.120	0.354	0.200
8								1.000	0.378	-0.203	-0.279	0.355	-0.171	-0.070
9									1.000	-0.225	-0.301	0.388	-0.099	0.021
10										1.000	0.247	-0.194	0.390	0.160
11											1.000	-0.423	0.233	0.067
12												1.000	-0.240	-0.055
13													1.000	0.124

N = 524 GPA = 2.0500

See page 100 for identification of variables in the chart

Multiple regression equations

Step 1 F =167.929** SEy = .634 M^R=.4934 df = 1, 522 $Y=.7466+.0744X_1$
Step 2 F=13.711** SEy=.626 MR=.5126 df=2, 521 $Y=.2138+.0745X_1+.0306X_5$
Step 3 F=5.339* SEy=.624 MR=.5199 df=3, 520 $Y=.1175+.0735X_1+.0248X_5+.0164X_{10}$
An MR of .5082 with 2, 521 df has an F value of 62.2337 which is significant above the .01 level of confidence

**Significant above .01 level of confidence
*Significant above .05 level of confidence

COMPOSITE EVALUATIVE, POTENCY, AND ACTIVITY SCORES (TOTAL) COMBINED WITH ACT SCORES FOR 524 MALE SUBJECTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	y
1	1.000	-0.084	0.007	-0.021	0.003	-0.105	0.166	-0.093	0.050	0.108	-0.042	0.041	0.236	0.493
2		1.000	0.249	0.275	0.259	0.258	0.305	-0.122	-0.158	0.261	0.248	-0.197	0.205	0.068
3			1.000	0.359	0.384	0.370	0.272	-0.169	-0.100	0.277	0.250	-0.244	0.177	0.077
4				1.000	0.315	0.310	0.095	-0.233	-0.176	0.138	0.373	-0.282	0.064	-0.070
5					1.000	0.318	0.258	-0.210	-0.193	0.294	0.315	-0.254	0.286	0.129
6						1.000	0.285	-0.190	-0.120	0.198	0.213	-0.193	0.158	-0.013
7							1.000	-0.083	-0.171	0.439	0.149	-0.155	0.364	0.226
8								1.000	0.408	-0.252	-0.353	0.386	-0.167	-0.071
9									1.000	-0.218	-0.346	0.444	-0.125	0.002
10										1.000	0.237	-0.206	0.396	0.174
11											1.000	-0.498	0.227	0.025
12												1.000	-0.193	-0.012
13													1.000	0.148

N = 524   GPA = 2.0500

See page 100 for identification of variables in the chart.

Multiple regression equations

Step 1 F = 167.92** SEy - .634 MR = .4934 df = (1,522)′ = .7466 + $.0744X_1$

Step 2 F = 15.116** SEy - .625 MR = .5145 df = (2,521)′ = .3072 + $.0707X_1$ + $.0131X_1$

Step 3 F = 6.207** SEy = .622 MR = .522 df = (3,520) Y = -.0351 + $.0713X_1$ + $.0082X_5$ + $.0108X_7$

Step 4 F = 3.853** SEy = .621 MR = .5280 df =(4,519) Y = .3530 + $.0702X_1$ - $.0089X_4$ + $.01029X_5$ + $.0111X_6$

Step 5 F = 3.110** SEy = .619 MR = .5320 df = (5,518) Y = .26602 + $.07139X_1$ = $.00589X_2$ - $.01060X_4$ + $.00941X_5$ + $.00932X_7$

An MR of .5204 has an F value of 103.600 with 5, 518 df, which is significant above the .01 level of confidence.

** Significant above .01 level of confidence.

EVALUATIVE FACTOR COMBINED WITH ACT SCORES FOR 420 FEMALE SUBJECTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	y
1	1.000	0.087	0.049	-0.032	0.049	-0.151	0.111	-0.321	-0.190	0.077	0.023	-0.161	0.196	0.592
2		1.000	0.204	0.241	0.256	0.149	0.085	-0.185	-0.194	0.315	0.279	-0.192	0.158	0.067
3			1.000	0.182	0.178	0.237	0.015	0.096	0.158	0.118	0.241	0.177	0.101	0.086
4				1.000	0.305	0.236	-0.124	0.175	-0.164	0.074	0.304	-0.158	0.094	-0.055
5					1.000	0.238	0.090	-0.222	-0.065	0.253	0.248	-0.162	0.227	0.104
6						1.000	0.121	0.068	0.001	0.208	0.186	0.092	-0.079	-0.099
7							1.000	0.178	0.175	0.219	-0.069	0.091	0.987	0.093
8								1.000	0.360	-0.203	-0.247	0.339	-0.236	0.222
9									1.000	-0.097	-0.216	0.453	-0.161	-0.183
10										1.000	0.241	-0.290	0.362	0.185
11											1.000	-0.321	0.169	0.951
12												1.000	-0.224	-0.122
13													1.000	0.143

N = 420   GPA 2.3968

See page 100 for identification of variables in the chart.

Multiple regression equations

Step 1 F=225.770** SEy=.585 MR=0.5922 df=., 418 $Y=.7975+.0954X_1$

Step 2 F=12.908** SEy=.576 MR=.6084 df =2, 417 $Y=.4174+.0937X_1+.0284X_{10}$

An MR of .60844 with 2, 417 df has an F value of 122.5563 which is significant above the .01 level of confidence

**Significant above .01 level of confidence

POTENCY FACTOR COMBINED WITH ACT SCORES FOR 420 FEMALE SUBJECTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	y
1	1.000	-0.014	0.004	0.014	0.204	-0.000	0.127	-0.072	0.089	0.138	0.002	0.002	0.170	0.592
2		1.000	0.219	0.077	0.192	0.104	0.211	-0.008	-0.009	0.147	0.148	-0.127	0.087	-0.074
3			1.000	0.132	0.354	0.020	0.183	-0.075	-0.055	0.298	0.265	-0.103	0.232	0.061
4				1.000	0.062	0.143	0.037	-0.025	-0.037	0.032	-0.064	0.042	0.019	0.023
5					1.000	0.026	0.309	-0.173	-0.018	0.288	0.250	-0.056	0.235	0.191
6						1.000	-0.015	0.046	-0.023	-0.035	-0.030	0.002	0.049	0.009
7							1.000	-0.007	-0.033	0.309	0.166	-0.074	0.279	0.126
8								1.000	0.260	-0.042	-0.062	0.196	-0.056	-0.066
9									1.000	-0.017	-0.076	0.333	-0.054	0.058
10										1.000	0.389	-0.249	0.338	0.214
11											1.000	-0.293	0.245	0.029
12												1.000	-0.160	-0.042
13													1.000	0.154

N = 420 GPA - 2.3968

See page 100 for identification of variables in the chart

Multiple regression equations

Step 1 $F = 225.770^{**}$ $SEy = .585$ $MR = .592^{**}$ $df = (1,418)$ $Y = .7975 + .0954X_1$

Step 2 $F = 11.770^{**}$ $SEy = .577$ $MR = .6071^{**}$ $df = (2,417)$ $Y = .4962 + .0924X_1 + .0241X_{10}$

Step 3 $F = 5.034^{*}$ $SEy = .574$ $MR = .6133^{**}$ $df = (3, 416)$ $Y = .7272 + .0919X_1 - .0186X_2 + .0265X_{10}$

An MR of .61325 with 3, 416 df has an F value of 83.5882 which is significant above .01 level of confidence

**Significant above .01 level of confidence
*Significant above .05 level of confidence

ACTIVITY FACTOR COMBINED WITH ACT SCORES FOR 420 FEMALE SUBJECTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	y
1	1.000	0.090	0.096	0.090	0.177	0.028	0.225	-0.262	-0.064	0.100	0.110	-0.214	0.222	0.592
2		1.000	0.216	0.328	0.271	0.240	0.219	-0.193	0.078	0.184	0.270	-0.094	0.171	0.117
3			1.000	0.320	0.269	0.268	0.232	-0.109	-0.081	0.184	0.190	-0.225	0.124	0.067
4				1.000	0.398	0.333	0.173	-0.195	-0.103	0.070	0.291	-0.205	0.169	0.017
5					1.000	0.363	-0.282	-0.222	-0.147	0.217	-0.247	-0.224	0.308	0.173
6						1.000	0.312	-0.059	-0.131	0.185	0.196	-0.096	0.237	0.018
7							1.000	-0.041	-0.079	0.435	0.204	-0.163	0.358	0.269
8								1.000	0.323	-0.112	-0.281	0.167	-0.210	-0.180
9									1.000	-0.647	-0.121	0.291	-0.161	-0.031
10										1.000	0.304	-0.223	0.313	0.207
11											1.000	-0.362	0.214	0.134
12												1.000	-0.178	-0.106
13													1.000	0.162

N = 420   GPA = 2.3968

See page 100 for identification of variables in the chart

Multiple regression equations

Step 1 F = 225.770** SEy = .585 MR = .5922 df = 1,41 y = .7975 + .0954X_1

Step 2 F = 14.713** SEy = .575 MR = .6106 Y = .4905 + .0930X_1 + .0266X_{10}

Step 3 F = 4.712* SEy = .573 MR = .6163 y = .3899 + .0902X_1 + 0.0178X_7 - 0.019X_{10}

An MR of .61632 with 3,416 df has an F value of 84,9056 which is significant above the .01 level of confidence.

**Significant above .01 level of confidence
*Significant above .05 level of confidence

COMPOSITE EVALUATIVE POTENCY AND ACTIVITY SCORES (TOTAL) COMBINED WITH ACT SCORES FOR 420 FEMALE SUBJECTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	y
1	1.000	0.084	0.069	0.089	0.192	-0.044	0.229	-0.279	-0.061	0.123	0.055	-0.142	0.221	0.592
2		1.000	0.229	0.263	0.285	0.104	0.144	-0.222	-0.058	0.196	0.265	-0.120	0.155	0.059
3			1.000	0.243	0.341	0.221	0.196	-0.162	-0.133	0.286	0.286	-0.261	0.178	0.095
4				1.000	0.329	0.175	0.087	-0.196	-0.058	0.127	0.271	-0.113	0.087	0.040
5					1.000	0.258	0.268	-0.319	-0.128	0.299	0.324	-0.214	0.345	0.198
6						1.000	0.165	-0.025	-0.121	0.135	0.156	-0.107	0.169	-0.029
7							1.000	-0.089	-0.120	0.404	0.116	-0.138	0.356	0.228
8								1.000	0.352	-0.216	-0.334	0.320	-0.236	-0.201
9									1.000	-0.087	-0.176	0.376	-0.151	0.048
10										1.000	0.401	-0.370	0.372	0.227
11											1.000	-0.417	0.211	0.078
12												1.000	-0.202	-0.108
13													1.---	0.172

GPA = 2.3968

See page 100 for identification of variables in the chart

Multiple regression equations

Step 1 F = 225.770** SEy = .585 MR = .5922 df = 1,41 $y = .7975 + .0954X^1$

Step 2 F + 16.124** SEy = .574 MR = .6123 df = 2,417 $y = .3718 + .0923X_1 + .0114X_{10}$

An MR of .6123 with 3.416 df has an F value of 125.632 which is significant above the .01 level of confidence

**Significant above .01 level of confidence

EVALUATIVE FACTOR COMBINED WITH ACT SCORES FOR 944 MALE AND FEMALE SUBJECTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	y
1	1.000	-0.003	0.010	-0.089	0.017	-0.144	0.074	-0.275	0.082	-0.073	-0.025	-0.060	0.138	0.501
2		1.000	0.240	0.268	0.261	0.205	0.163	0.126	-0.218	0.262	0.269	-0.186	0.178	0.076
3			1.000	0.219	0.263	0.244	0.075	-0.093	-0.155	0.154	0.215	-0.151	0.109	0.138
4				1.000	0.339	0.309	-0.077	-0.196	-0.242	0.136	0.393	-0.243	0.175	0.001
5					1.000	0.250	0.086	-0.203	-0.181	0.224	0.288	-0.206	0.241	0.145
6						1.000	0.171	0.045	-0.078	0.200	0.184	-0.107	0.101	-0.053
7							1.000	0.182	0.033	0.271	-0.033	0.025	0.144	0.124
8								1.000	0.360	-0.165	-0.250	0.298	-0.178	-0.182
9									1.000	-0.169	-0.267	0.407	-0.185	-0.153
10										1.000	0.208	-0.225	0.318	0.149
11											1.000	-0.379	0.186	0.042
12												1.000	-0.191	-0.080
13													1.000	0.154

N = 944   GPA = 2.2043

See page 100 for identification of variables in the chart

Multiple regression equations

Step 1 F=314.899** SEy = 0.646 MR=.5005 df =1,942 $Y+0.08376+0.0796X_1$

Step 2 F=23.896** SEy=0.639 MR=.5188 df=2, 941 $Y=0.2079+0.0792X_1+0.0358X_5$

Step 3 F=13.0246** SEy =0.6346 MR=0.52829 df=3, 940 $Y=0.06609+0.07900X_1+0.02267X_3+0.02865X_5$

Step 4 F=7986** SEy=0.632 MR=0.5340 df=4, 939 $Y=0.1408+0.0781X_1+0.0207X_3+0.0257X_5-0.0173X_9$

Step 5 F=7.693** SEy=0.6300 MR=0.5394 df=5, 938 $Y=0.0412+0.0772X_1+0.0196X_3+0.0237X_5+0.0144X_7-0.0183X_9$

An MR of .5394 with 5, 938 df has an F value of 76.991 and is significant above the .01 level of confidence.

**Significant above .01 level of confidence

POTENCY FACTOR COMBINED WITH ACT SCORES FOR 944 MALE AND FEMALE SUBJECTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	y
1	1.000	-0.065	-0.022	0.021	0.077	-0.040	0.133	0.020	0.086	0.121	-0.057	0.044	0.177	0.500
2		1.000	0.196	0.055	0.186	0.138	0.244	-0.040	0.027	0.160	0.135	-0.073	0.106	0.004
3			1.000	0.186	0.329	0.123	0.203	0.062	0.045	0.242	0.246	0.149	0 148	0.022
4				1.000	0.189	0.310	0.098	-0.091	-0.083	0.000	0.119	-0.077	-0.056	-0.171
5					1.000	0.146	0.255	-0.145	-0.083	0.276	0.280	-0.141	0.232	0.010
6						1.000	0.078	-0.040	-0.033	-0.017	0.070	-0.051	0.049	0.075
7							1.000	-0.026	-0.050	0.338	0.173	-0.010	0.277	0.124
8								1.000	0.300	-0.098	-0.138	0.276	-0.031	-0.027
9									1.000	-0.046	-0.158	0.381	-0.047	0.062
10										1.000	0.293	-0.167	0.325	0.206
11											1.000	-0.330	0.238	0.003
12												1.000	-0.010	-0.002
13													1.000	0.166

N = 944 GPA = 2.2043

See page 100 for identification of variables in the chart

Multiple regression equations

Step 1 F=314.899** SEy=0.646 MR=.501 df =1, 942 $Y=0.838+.0796X_1$

Step 2 F=43.311** SEy=0.632 MR=0.5325 df=2, 941 $Y=1.3886+.0802X_1-0.0394X_4$

Step 3 F=28.911** SEy=0.623 MR=0.5221 df=3, 940 $Y=1.0527+0.0773X_1-0.0393X_4+0.0269X_{10}$

Step 4 F=4.716** SEy=0.622 MR=.55531 df=4, 939 $Y=0.918+0.0769X_1-0.0418X_4+0.0140X_5+0.0238X_{10}$

An MR of 558.4521 with 4, 939 df has an F value of 4.7160 which is significant above the .01 level of confidence

ACTIVITY FACTOR COMBINED WITH ACT SCORES FOR 944 MALE AND FEMALE SUBJECTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	y
1	1.000	-0.013	0.080	-0.003	0.068	0.005	0.209	-0.177	0.009	0.089	0.072	-0.094	0.212	0.501
2		1.000	0.225	0.291	0.260	0.211	0.223	-0.125	-0.085	0.226	0.260	-0.135	0.226	0.120
3			1.000	0.256	0.329	0.351	0.248	-0.163	-0.106	0.217	0.225	-0.215	0.189	0.076
4				1.000	0.345	0.319	0.135	-0.170	-0.123	0.095	0.325	-0.231	0.107	-0.015
5					1.00	0.362	0.264	-0.188	-0.171	0.259	0.274	-0.238	0.277	0.156
6						1.000	0.265	-0.048	-0.102	0.199	0.213	-0.133	0.195	0.021
7							1.000	-0.064	0.082	0.414	0.177	-0.140	0.352	0.225
8								1.000	0.242	-0.163	-0.280	0.305	-0.187	-0.117
9									1.000	-0.142	-0.221	0.342	-0.135	-0.019
10										1.000	0.272	-0.207	0.351	0.174
11											1.000	-0.396	0.227	0.101
12												1.000	-0.210	-0.075
13													1.000	0.168

N = 944   GPA = 2.2043

See page 100 for identification of variables in the chart

Multiple regression equations

Step 1 F=314.899** SEy=0.646 MR=.5005 df+1, 942 $Y=0.8376+0.0796X_1$

Step 2 F=22.148** SEy=0.639 MR=.5175 df=2, 941 $Y=0.5500+0.0778X_1+0.0243X_2$

Step 3 F=12.932** SEy=0.635 MR=0.5270 df=3, 940 $Y=0.2892+0.0783X_1+0.0201X_2+0.0299X_{10}$

Step 4 F=6.733** SEy=0.633 MR=0.5318 df=4, 939 $Y=0.0838+0.0777X_1+0.0169X_2+0.0174X_5+0.0171X_{10}$

Step 5 F=8.710** SEy=.631 MR=0.5380 df=5, 938 $Y=0.4825+0.0774X_1+0.0207X_2-0.0290X_4+0.0234X_5+0.0166X_{10}$

An MR of .5389 with 5, 938 df has an F value of 76.391 which is significant above the .01 level of confidence.
**Significant above .01 level of confidence.

COMPOSITE EVALUATIVE, POTENCY AND ACTIVITY FACTORS COMBINED WITH ACT SCORES FOR 944 MALE AND FEMALE SUBJECTS

	1	2	3	4	5	6	7	8	9	10	11	12	13	y
1	1.000	-0.023	0.027	-0.004	0.075	-0.070	0.195	-0.167	0.010	0.111	-0.004	-0.036	0.211	0.501
2		1.000	0.246	0.225	0.270	0.182	0.230	0.163	0.123	0.236	0.257	0.165	0.200	0.087
3			1.000	0.285	0.368	0.303	0.237	-0.167	-0.117	0.282	0.266	-0.248	0.186	0.097
4				1.000	0.299	0.294	0.097	-0.206	-0.111	0.116	0.311	-0.218	0.017	-0.093
5					1.000	0.290	0.261	-0.252	-0.169	0.296	0.319	-0.237	0.300	0.158
6						1.000	0.239	-0.076	-0.111	0.166	0.184	-0.162	0.132	-0.051
7							1.000	-0.085	-0.147	0.422	0.133	-0.149	0.348	0.213
8								1.000	0.386	-0.237	-0.345	0.359	-0.194	-0.125
9									1.000	-0.166	-0.277	0.414	-0.143	-0.032
10										1.000	0.308	-0.274	0.386	0.201
11											1.000	-0.463	0.222	0.053
12												1.000	-0.189	-0.062

N = 944 GPA = 2.2043

See page 100 for identification of variables in the chart

Multiple regression euqations

Step 1 F=314.899** SEy=.646 MR=.5005 df=1, 942 $Y=.8376+.0796X_1$

Step 2 F=27.518** SEy=.638 MR=521 df=2, 941 $Y=.4354+.0770X_1+.0107X_{10}$

Step 3 F=15.627** SEy=.633 MR=.5327 df=3, 940 $Y=1.1342+.0767X_1-.0141X_4+.0117X_{10}$

Step 4 F=18.352** SEy=.627 MR=.5454 df=4, 939 $Y=.8810+.0757X_1-.01850X_4+.0118X_5+.00926X_{10}$

Step 5 F=6.7423** SEy=.625 MR=.5500 df=5, 938 $Y=.7579+.0764X_1+.00649X_2-.0199X_5+.0083X_{10}$

An MR of .5500 with 5, 938 df has an F value of 57.978 which is significant above the .01 level of confidence.
**Significant above .01 level of confidence